THE

QUEENSLAND AGRICULTURAL JOURNAL,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

VOLUME XXXI.

JULY TO DECEMBER, 1913.

BRISBANE:
BY AUTHORITY: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER, BRISBANE.

1913.

QUEENSLAND AGRICULTURAL JOURNAL.

VOL. XXXI. PARTS 1 TO 6.

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QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXXI. JULY, 1913. Part 1.

Agriculture.

THE PRICKLY PEAR PROBLEM.

By ERNEST A. SMITH.

Among the various tribulations that the man on the land has to contend against, the most formidable is the pest of the prickly pear. In many parts of the State, the pear-infested districts present a problem for which it is hard to find a solution. So far as can be seen at present, there appears no practical remedy that can be relied upon to utterly destroy the pear at a cost equivalent to the value of the land, unless, indeed, the experiment now being carried on at Dulacca by Mr. O. C. Roberts turns out to be successful. The cochineal insect may live up to its reputation as a destroyer in certain localities, but the pear-infested areas are so vast that the beneficial results must be extremely dubious. The numerous birds who live on the pear fruit are sure to be the deadly enemies of any such insects; and, considering that the pear is always spreading and increasing in density, the outlook can hardly be regarded as satisfactory. The pear-plant is indeed the most difficult to deal with, for not only is the seed spread wholesale by emus and birds which live on the seed, but every leaf and every portion of a leaf takes root even in the most uncongenial ground, and in a short time becomes a flourishing

plant. As is very generally known, the prickly pear is an air plant, and thus does not depend for its existence on the soil in which it grows. In fact, a leaf placed on a wire fence will not loose its vitality. This peculiarity renders it all the more difficult to deal with, and its destruction is never really complete till it is consumed by fire and dissolved into ashes. None of the poisonous mixtures that have been invented have proved, so far as is known, entirely efficacious by themselves, for, unless the sprayed pear has been collected into heaps and burnt, the apparently dead leaves will be found under favourable conditions to be throwing out green shoots, and the whole work has then to be done all over again. The tenacity of life in the pear seed is enormous. If an area of land has been cleaned, ploughed, and sown with wheat, the pear will be found to be coming up thick among the growing crop, and even the second year of cultivation will still find a fair proportion; and it is not till the third ploughing that its complete disappearance may be hoped for. The present condition of things must be regarded as most unsatisfactory, for every year the pear is enlarging its boundaries, and, in addition, what is known as lightly-infested country is becoming more heavily infested, and consequently far more difficult to deal with. Such being the case, it would seem to be a matter of policy to devise some means whereby the pear could be kept within its present boundaries, and it has been suggested that a cordon of selections (bonus selections if necessary) should be drawn round the infested districts, so that the pest should not be allowed to spread and devastate what is now clean country. The difficulties even in this course of action are considerable, for not only are the seeds scattered far and wide by emus, who are the worst offenders in this respect, but the numerous birds who feed on the pear seed propagate the pest freely by their droppings. There can be no doubt that the emu should be extirpated in all pear-infested districts, for to allow them to increase and multiply by the favour of a close season seems simply to be allowing a most favourable medium for the dissemination of pear to exist, to the very great detriment of the country at large. The ringing of the timber prevents the smaller birds roosting on the withered branches and to some extent might provide against infection in that direction. But if the pear is not to be allowed to spread, it stands to reason that all known means of propagation should be blocked, and therefore the extermination of the emu should be regarded as a first and most absolute necessity. There is no doubt that the emu is a bird, picturesque in a way and typical of Australia, but even for these sentimental reasons there can be no gainsaying the fact that the emu has done greater damage in propagating the pear and in the cause of its extension from infested to clean country than could be recouped by the expenditure of many thousands of pounds. It has to be remembered

that emus travel over great distances and are stopped by no fences, for if they cannot go through they go over, so that it is practically impossible to circumscribe their activities. In fact, the only way to deal with them is to bring them under the Marsupial Act and put a price on their heads, as is done with dingoes and suchlike vermin. If this were done, there would be probably plenty of men who would hunt them down for the sake of the bonus. It is said that "prevention is better than cure," and if the prickly-pear pest can be restrained from spreading by the extermination of the emu, then surely the emu ought to go.

As for the difficulties of clearing the pear-infested country, the two that loom largest are the questions of money and labour—of money because the land is at present worth nothing like the cost of clearing, and of labour because it is work that fails to appeal to the ordinary Australian bushman. In fact, in many districts men in want of work will undertake anything rather than tackle the job of cutting pear. The reason is not far to seek. The spikes of the pear are very penetrating and often poisonous, and when once they get into clothing or blankets, are very hard indeed to get rid of. It is related that a party of new chums when tackling the pear for the first time spread out their blankets on the pear plants to air. The result may be more easily imagined than described, and doubtless those men imbibed a wholesome dread of prickly pear for the future. As for the destruction of the pear where it has already got a firm hold, there can be no doubt that the Government is taking a wise step in delegating the duties of clearing the roads and reserves to the shire councils, who are on the spot and should possess the most adequate means of dealing with it. There remain, however, vast areas of unselected Government land, often heavily infested, and such naturally form centres of contagion to the surrounding selections. The remedy for this state of things is not obvious. Whether settlers should be induced to take up such land by the granting of bonus selections or whether such land should be left till some more easy and economical method of destruction be discovered, are questions more easily asked than answered. But there is no doubt that all lightly infested country should be so dealt with as to prevent it becoming heavily infested, and that no efforts should be spared to induce every selector of pear-infested land to do his utmost to keep down the pest. Under present conditions it is to be feared that the area of pear-infested country is increasing year by year; and this should be surely preventable by the wholesale slaughter of the emus and, by drawing a cordon of special selections round the pear-infested districts, so far as is humanly possible keep the pest within present boundaries, and not allow it to trench still further on our Crown lands and thus destroy the most valuable asset of the State.

SILAGE CROPS AT ROMA STATE FARM.

By H. E. Soutter.

To ascertain the relative value for this part of the State of some of the most prolific fodder crops and the approximate expense incurred in conserving same in the form of ensilage, sowings were made on a freshly cleared, fairly rich alluvial flat, on the 8th of October last, of the following, viz.:—Collier's Sorghum, Early Orange Cane, and Tolfer's Sorghum.

The seed was put in in drills 3 ft. 6 in. apart, at the rate of 1¾ lb. to the acre, being mixed with the fertiliser, which was applied at the rate of 20 lb. to the acre, composed of 15 lb. of superphosphate and 5 lb. of sulphate of potash, the implement used for the purpose being a Massey-Harris fertiliser and seed drill, which admits of three drills being sown at once.

Opportune rains fell during the first two months the crops were in the ground, 4.16 in. being recorded. During the next four weeks, which were abnormally hot, in consequence of which there was undoubtedly excessive evaporation, only .55 rain was registered. From this time until the crops were harvested very congenial conditions prevailed, with the result that fairly heavy yields of fodder for this part were obtained from the different varieties.

The effects of the dry spell on the plants were noticeable at harvest time, more especially on situations where the crops were inclined to be rank, the foliage being drier and affected much in the same manner as a crop partly frosted—that is, in some cases portions of a leaf would be dry, the rest being green and succulent.

Previous to sowing, the land, which was virgin soil, received one cultivating with a one-way disc, which killed all vegetation by removing all the soil to a depth of 2½ in. The ground was then worked in the opposite direction to a depth of 5 in. and then harrowed.

During the growth of the crop, in its early stages, it was harrowed twice across the drills, after rain, the first operation being carried out about two weeks after the plants appeared, and the second when they were about 9 in. high. This treatment obviated the use of the scuffler, thereby reducing cost of production per acre at least 1s. 6d.

When the crops reached a height of about 2 ft. the presence of weeds rendered the use of the scuffler necessary, though even had such not appeared scuffling would have proved beneficial by retaining, and producing where absent, the essential surface mulch.

The crops were fit for the purpose for which they were sown by the end of January, hardly any differences in reaching this stage being noticeable amongst the varieties. The dry spell aforementioned would assert, no doubt, a certain influence in this direction.

A new Deering Maize-binder was utilised in cutting the crop, and accomplished the work in a most satisfactory manner. The use of this implement reduces the cost per ton considerably, as it not only curtails the labour required in the field, but it greatly facilitates loading and unloading and the handling of the material at the cutter. In addition to this, the material does not become bent or broken, and an even feed is

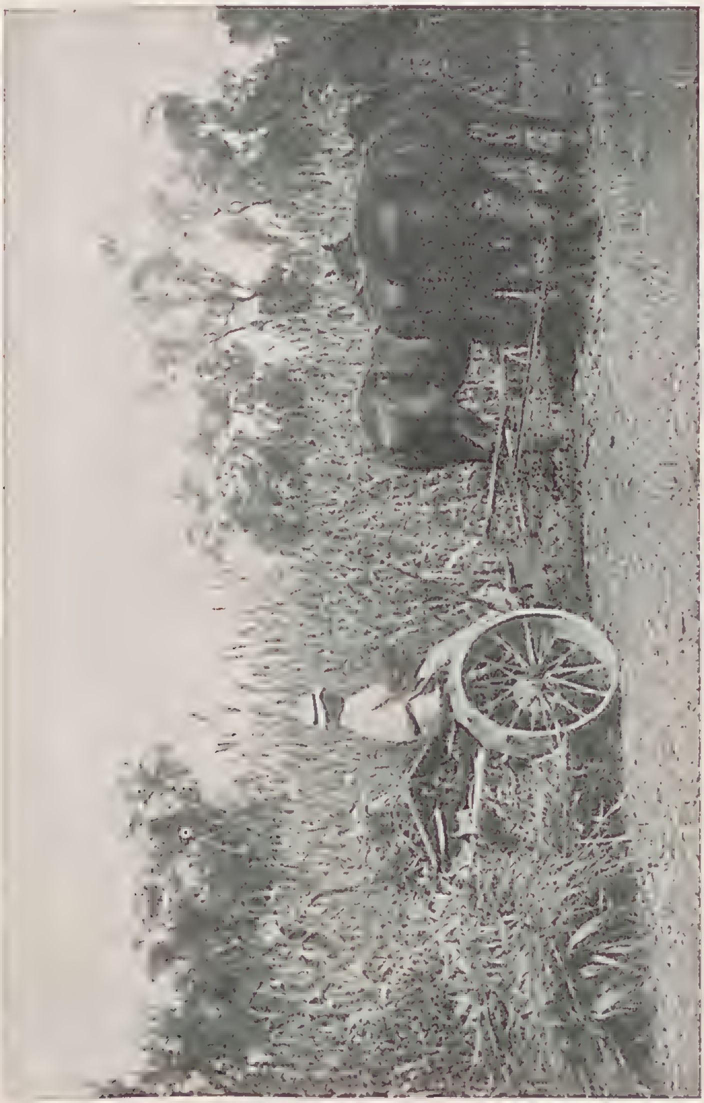


PLATE 73.—HARVESTING CROP—COLLIER'S SORGHUM—WITH DEERING MAIZE BINDER FOR SILAGE.

maintained, with the result that the chaffed fodder is more uniform in size. There is one advantage which hand cutting has over this implement on rough ground—that is, the crop can be cut closer.

Whilst on the subject of this machine it might be mentioned that, though it worked satisfactorily in crops sown 3 ft. 6 in. apart, in a crop of maize harvested last week, sown 3 ft. apart, it was found that, though

the cutting and binding were performed as well as before, the sheaves were left in such a position that on the next round being taken the outside horse walked on them, in consequence of which a number of cobs were trampled off. If it is not intended to use the sheave-carrier when harvesting a crop, it appears as if the crop could be sown closer where conditions warrant—that is, than 3 ft.—as the position of the deposited bundle would be between the two outside horses.

Owing to lack of facilities for the weighing of the crops as they were taken off no reliable information on this score is forthcoming, but it is estimated that the Early Orange cane was at least 2 tons to the acre heavier. In addition to this, it evinced its superiority over the other two varieties in withstanding droughty conditions; it is slightly coarser in the stalk, but probably carries more flag and is not so tall. This last feature, in conjunction with its heavy stalk, results in it still remaining erect after a storm, which would blow down and tangle up the other kinds to such an extent as to render harvesting with machinery a very difficult if not impossible proceeding.

Whether the feeding value of Early Orange is equal to that of either of the others is a matter of doubt, and it is to be regretted that provision for further investigation in this direction was not thought of when siloing the crops.

The approximate expenditure incurred in producing 1 ton of the ensilage made from this crop is as follows:—

	£	s.	d.
Cultivating 2½ in. deep, per acre	0	3	2
Ploughing 5 in. deep, per acre	0	5	0
Harrowing three times, per acre	0	2	3
Seed, per acre	0	0	4½
Twine, per acre	0	5	0
Scuffling, per acre	0	1	6
Harvesting, per acre	0	5	9
Loading, per acre	0	6	6
Carting and unloading, 6 horses, at 2s. 6d.; 2 men, at 6s. 6d	1	8	6
Cutting, &c., 2 men at 7s.	0	14	0
Lubricants, per acre	0	1	0
Oil (fuel), per acre	0	2	3
Wear and tear, per acre	0	3	0

Yield, estimated settled content of silo, 10 tons per acre, £3 18s. 3½d.
Approximate cost per ton .. .. ..7s. 10d.

This amount may appear rather high, and undoubtedly it is when compared with the cost of production where all facilities exist.

The factor which accounts for the excessive cost of material is the haulage, which absorbs nearly one-third of it. This is due to the circumstance that the distance from the paddock to the silo is over half a mile, up hill, over a good deal of very light sandy ground.

This only further demonstrates how essential it is, when it is intended to grow crops for silage purposes, to choose a site as close as possible to where it is intended to conserve them.

STOCK FOODS.

BY J. C. BRÜNNICH.

At the time when green feed is getting scarce, farmers frequently desire to know what quantities of dry fodders and of other more concentrated foodstuffs have to be fed to stock to keep them in good condition.

A very large number of analyses of various grasses, cereals, leguminous crops, grains and seeds, and root crops, have been analysed at our agricultural laboratory from time to time, and the results published in our annual reports. As these reports are not always to hand, I have prepared a short table of the analysis and composition of the most common stock foods. In the tables (Table II.) at the end of this paper the amounts of constituents most important for nutrition contained in every 100 lb. of fodder are given under the headings: **Crude Protein, Carbohydrates, Crude Fibre, Crude Fat,** and **Crude Ash.** Only part of these constituents become really **available** to the animal by being more or less digestible. Again, we must bear in mind that the various classes of farm stock, and even individual animals of each class, have a greatly varying power of digestion. All ruminants—animals like oxen, cows, sheep, and goats, which chew their cud—digest much larger proportion of the nutriment constituents of foods than non-ruminant animals, like horses, pigs, &c. This variation in digestibility applies more particularly to the coarse and bulky fodders, straws and hay, of which a horse digests much less than a cow or sheep.

Unfortunately, no actual feeding experiments on the digestibility of our stock foods have been carried out in Queensland, and all our calculations of the digestible portions of such foods have to be based on European and American experiments. The **values of digestible** constituents, contained in every 100 lb. of fodder, are calculated (in Table II.) on the average digestion of ruminants, and apply therefore chiefly to the feeding of cows, sheep, &c. The values would be lower when the fodders are used for the feeding of horses and pigs.

When calculating actual rations the values of digestible nutrients have again to be modified, as in all cases a certain amount of energy is

required for mastication and digestion itself, and the **"availability"** of a food for actual productive purposes will in many cases be very considerably lowered. Of the digestible nutrients in the more easily digested fodders, like roots, grain, meals, &c., as much as 95 per cent. may be available, but in the case of rough fibrous foods, straw, poor coarse hay, &c., only 30 per cent., or about one-third, of the food is actually made use of, two-thirds of the energy being wasted for mastication and digestion. A liberal extra allowance has therefore to be made when using coarser fodders in the making up of rations.

The question of feeding farm stock was dealt with fairly fully in my nineteenth lecture on "The Chemistry of the Farm, Dairy, and Household," which may be obtained by anyone on application to the Department of Agriculture and Stock, and therefore I will in this paper only briefly recapitulate a few of the most important points.

The nitrogenous compounds, included under the heading **"Crude Proteins,"** are called the **flesh-forming constituents** of food, as their chief function is the production of blood, muscle, and repair of waste tissue. The **nitrogen-free compounds** come under the headings: Carbohydrates (starch and sugars), crude fibre, and crude fat, which all are **heat** or **energy producers,** and may also form fat.

Every efficient food ration must contain a minimum amount of proteins and a certain amount of total heat or energy producing constituents, and in order to avoid waste of one or the other, a certain ratio, called the **nutritive ratio,** between the amounts of digestible proteins and digestible non-nitrogenous (energy producing) nutrients has to exist in a properly balanced ration. This ratio must be changed in accordance with age, and the amount of work performed by the animal.

When judging the value of fodder as food for stock we have to consider besides the practical points of succulence, flavour, and palatability, the chemical composition with regard to the amounts of: 1st, nitrogenous constituents; 2nd, heat or energy producing nutrients; 3rd, mineral matter; and, lastly, of water.

The amount of **water,** or rather the ratio between water and total dry food material, is of some importance, cattle requiring a ratio of about 4 to 1, sheep only 2.1, whilst horses, according if they are at rest or working, require ratios from 2.1 to 3.6 to 1. When feeding cattle with dry rations larger amounts of water are required; as soon as roots are fed the quantity of water required is much less, and when feeding very succulent watery foods, as, for instance, prickly pear leaves, no water at all need be supplied; in fact, giving water to cattle so fed may be even dangerous.

The **energy value** of a fodder may be measured by the amount of heat evolved on burning, and may also be called **fuel value.** For the calculation of this value starch is taken as the unit, the other carbohydrates, sugars and fibre, are taken of the same heat value, fat produces 2.3 times the amount of heat, and protein only about $\frac{9}{10}$ the amount. The total amount of energy produced by all the digestible nutrients of a food is also expressed as its **starch equivalent,** and may be used for comparison of the feeding value of the various fodders.

The old feeding standards of *von Wolff* have been slightly modified on the results of more recent feeding experiments carried out by *Professor Kellner,* of the Möckern Experiment Station in Germany, and he applies in his feeding standard principally the starch equivalent of foods for the making up of suitable rations. Carefully conducted trials carried out in Denmark and Sweden, which were made more particularly to ascertain the milk production from certain rations, gave results closely approximating the values based on Kellner's starch equivalents.

In the following short table the actual net available amounts of energy produced by food is taken into account, and all compared with wheat taken as the unit.

Equivalent Quantities of Food.

—	Based on Kellner's Starch Equivalent.	Danish Scale.	Swedish Scale.	Lawe's and Gilbert's Scale.
Wheat	1	1	1	1
Bran	1·5	1	1·1	1·25
Oil Cake	·9 to 1·1	1	·85 to 1	·9 to 1·1
Clover Hay	2·2	2	2·5	2
Meadow Hay	2·3	2·5	2·6	2·1
Mangolds	11	10	10	13
Turnips	15	12	12·5	19
Straw	4·2	4	4	2·5
Green Fodder	7 to 9	10	7·5 to 11	...
Potatoes	3·8	4	5	8·5

In order to compare this table with the values given in my larger table at the end of this paper, in which the starch value of wheat is taken as 16, meaning that it takes 16 lb. of wheat to supply a cow of 950 to 1,000 lb. live weight with sufficient amount of energy-yielding nutrients for the production of 25 lb. of milk daily, we find, for instance, straws to have a starch value from 23 to 33 lb., or from 1½ to 2 times

the amount of wheat. As already previously stated, a large amount of energy is wasted in the mastication and digestion of straw, and therefore according to Kellner's and other practical tests straw must be actually fed about 4 times the amount of wheat to produce the same energy. In the case of more digestible foods the difference between our theoretical starch values and Kellner's available starch equivalent will seem much smaller, and we find, for instance, that they practically agree in the case of bran, oilcakes, and potatoes.

For the actual calculation of rations for farm stock we must now take Table I. of "Kellner's Standard Rations," which we find gives values slightly lower than those given in von Wolff's table previously published. Again, in the case of two values being given we may safely assume that with our more favourable climatic conditions the lower value will suffice for the rations of our stock.

TABLE I.

Kellner's Standard Rations.

PER 1,000 LB. LIVE WEIGHT PER DAY.

Animal.	Dry Matter in Total Ration.	Digestible.	
		Protein.	Starch Equivalent.
Horse (light work)	18-23	1·0	9·2
Horse (medium work)	21-26	1·4	11·6
Horse (heavy work)	23-28	2·0	15·0
Fattening Cattle—			
At 550 lb. live weight	26	2·8	14·4
At 770 lb. " "	26	2·2	11·2
At 950 lb. " "	26	1·5	10·0
Milch Cattle—			
Yielding 10 lb. milk per 1,000 lb. live weight	22-27	1-1·3	7·8-8·3
Yielding 20 lb. " " " "	25-29	1·6-1·9	9·8-11·2
Yielding 30 lb. " " " "	27-33	2·2-2·5	11·8-13·9
Yielding 40 lb. " " " "	27-34	2·8-3·2	13·9-16·6
Fattening Lambs—			
65 lb. live weight	31	3·5	17
110 lb. " "	28	2·5	15
Full grown	24-32	1·6	14·5
Fattening Pigs—			
44 lb. live weight	44	6·2	33·8
110 lb. " "	36	4·5	32·0
200 lb. " "	28	3·0	24·5

In this table all rations are calculated as required per day and per 1,000 lb. live weight. From the table we see that a horse heavily worked requires double the amount of proteins than a horse with light work. When fattening cattle or pigs, the amount of protein in the ration is reduced as the animals increase in weight. The quantities of digestible

nutrients necessary for the calculation of rations may all be taken from Table II.

In order to make the calculation easier the last two columns of Table II. give the **starch value** and **protein value** of each fodder expressed as the quantity in lb. required to be fed daily to a cow from 950 to 1,000 lb. live weight yielding about 25 lb. of milk requiring about 26 lb. dry material, containing 1·9 lb. protein and 11 lb. starch value, or very nearly equal to a horse fairly heavily worked. In all cases where the amounts of starch value and protein value are about the same we know that the fodder is a well-balanced ration. We find that 16 lb. of wheat would supply the necessary amount of protein and starch, but the total weight of dry matter, of which a cow requires about 26 lb., would not be sufficient.

Of Couch grass and Prairie grass, some of the most ideal feeds for dairy cattle, about ½ cwt. are required to supply the necessary protein and starch.

If we look at lucerne hay we find that about 21·4 lb. are required to supply the necessary amount of energy, but that only 13 lb. are required to supply the necessary protein, because lucerne hay has a nutritive ratio of 1 to 2·7, which indicates that it contains too much nitrogenous nutrient material as compared to carbohydrates, whereas a cow requires a ratio of about 1 part of digestible proteids to 5·4 parts of digestible carbohydrates, including fat.

If we feed, therefore, cows entirely on lucerne hay, we supply more nitrogenous material than necessary, which consequently goes to waste. It is therefore an advantage to feed a small quantity of lucerne hay and supplement the feed with fodders containing a comparatively higher amount of carbohydrates and fats, or of a wider nutritive ratio, like wheat straw, bush hay, potatoes, &c.

When using fodders like prickly pear leaves, rather poor in nitrogenous nutrients, the fodder must be supplemented with concentrated foods rich in nitrogenous constituents like cotton-seed meal, linseed meal, or oilcake.

For instance, we give a cow daily about 100 lb. of prepared prickly pear leaves (this would be a probable maximum) and supply therefore (see Table II.) only ·4 lb. proteins, and $5{\cdot}5 + 1{\cdot}0 + 2{\cdot}3 \times {\cdot}1 = 6{\cdot}7$ of starch value. To make up the necessary amount we add 25 lb. good bush hay, which supplies ¼ of $4 = 1{\cdot}0$ lb. proteins, and ¼ of $26{\cdot}2 + 25{\cdot}0 + 2{\cdot}3 \times 1{\cdot}1 = 13{\cdot}4$ lb. starch value, so that we still have not given sufficient nitrogenous material, which is easily made up by adding about 2 lb. of cotton-seed meal or linseed meal. Any other ration can be calculated easily in similar manner.

Table II.

COMPOSITION OF FODDERS.

Giving pounds of food materials, and of water, and of digestible nutrients contained in every 100 lb. of fodder.
Pounds of each fodder required to supply a cow of 750 to 1,000 lb. live weight, yielding 25 lb. milk daily, with 11 lb. starch equivalent, and 1.9 lb. protein.

	Water.	Crude Protein.	Carbohydrates.	Crude Fibre.	Crude Fat.	Crude Ash.	Digestible Nutrients. Protein.	Digestible Nutrients. Carbohydrates.	Digestible Nutrients. Fibre.	Digestible Nutrients. Fat.	Nutritive Ratio. 1 ÷	Starch Equivalent.	Protein Equivalent.
Green Fodders—													
Grasses and Cereals—													
Barley	79·0	2·7	8·0	7·9	·6	1·8	1·9	5·7	4·8	·4	6·0	84·6	100
Buffalo grass	77·4	2·7	12·3	4·6	·5	2·5	1·9	8·7	2·8	·3	6·4	79·6	100
Bush grass, good	61·1	4·7	14·7	14·0	·7	4·8	2·8	10·4	7·7	·5	6·5	53·2	68
Canary grass	76·5	3·4	12·2	5·3	·4	2·2	2·4	8·7	3·2	·3	5·3	74·9	79
Couch grass	64·2	4·7	18·0	8·5	·5	4·1	3·3	12·8	5·1	·3	5·6	51·3	58
Oats	62·2	3·4	19·3	11·2	1·4	2·5	2·5	12·2	6·7	1·0	8·5	47·1	76
Paspalum	64·2	3·2	18·1	9·6	·5	4·4	2·2	12·8	5·8	·3	8·8	52	86·5
Prairie grass	67·0	4·5	18·3	6·8	·6	2·8	3·1	13·0	4·1	·5	5·8	53·3	61·4
Rhodes grass	69·2	2·9	8·2	15·5	·4	3·8	2·0	5·8	9·3	·3	7·9	63	95
Wheat	75·8	1·6	6·0	14·6	·5	1·5	1·2	2·3	8·9	1·0	12·9	66·7	159
Maize	70·9	2·6	13·4	9·6	·5	3·0	1·5	9·8	6·4	2·4	14·5	48	127
Sorghum	69·2	2·1	14·9	10·0	1·2	2·6	1·0	11·2	5·9	·9	19·2	55·1	190
Sugar-cane tops	72·7	2·4	12·3	10·0	·8	1·8	1·3	9·0	6·3	·6	12·9	61·9	146
Legumes—													
Cowpea vines	77·9	3·5	7·8	6·9	·8	3·1	2·5	5·9	3·6	·4	4·2	87·3	76
Lucerne	76·0	5·2	10·4	4·3	·4	3·7	4·0	7·6	2·2	·2	2·6	79·7	47·6
Various—													
Prickly pear	88·2	·5	8·1	1·6	·1	1·5	·4	5·5	1·0	·1	16·7	156	475
Rape	84·5	2·3	8·1	2·6	·5	2·0	1·7	5·5	1·6	·3	4·6	119	112
Saltbush	67·8	5·0	14·8	6·6	·7	5·1	3·7	10·1	4·1	·5	4·2	59·3	51·5
Sheeps burnett	76·3	5·0	8·4	6·2	·7	3·4	3·7	5·7	3·8	·5	2·9	79·1	51·5
Sweet potato vine	85·6	2·1	6·2	2·8	·7	2·6	1·6	4·2	1·7	·5	4·4	130	119
Silage—													
Maize (corn)	73·6	1·8	10·8	10·0	·5	3·3	1·1	7·2	7·1	·4	13·8	68·4	173
Bush grass and weeds	58·5	5·2	13·1	15·2	1·3	6·7	3·1	7·8	9·1	·9	6·1	50·8	61·4
Sorghum	71·2	1·8	13·2	10·0	·5	3·3	1·0	8·8	6·5	·4	16·2	64·8	190

Roots, Tubers, &c.—													
Beets	77·0	2·1	17·0	1·8	·1	2·0	1·9	17·0	1·6	·1	9·9	54	100
Cabbages	90·5	2·4	3·8	1·5	·4	1·4	1·8	3·4	1·4	·4	3·2	152	106
Mangolds	87·0	1·3	7·8	2·0	·1	1·8	1·0	7·1	·9	·1	8·2	122	190
Potatoes	75·5	2·1	20·2	·7	·2	1·3	1·3	19·8	·4	·2	15·9	50·6	146
Ditto, sweet	71·1	1·5	24·7	1·3	·4	1·0	·9	24·2	·7	·3	28·4	42	212
Pumpkin	90·9	1·3	5·2	1·7	·4	·5	1·0	4·4	1·4	·3	6·5	150	190
Swedes	86·0	2·0	9·4	1·3	·1	1·2	1·6	8·9	1·2	·1	6·4	94·7	119
Turnips	89·5	2·7	5·2	1·4	·1	1·1	1·9	4·9	1·3	·1	4·3	137	100
Dry Fodders—													
Hay and Straw—													
Bush hay, good	7·5	6·1	38·6	39·8	1·9	6·1	4·0	26·2	25·0	1·1	13·4	19·3	47·6
Ditto, poor	6·9	2·8	36·6	45·3	1·1	7·3	3·5	23·4	27·2	1·0	38	19·8	136
Canary grass	10·6	15·2	34·6	30·0	2·1	7·5	8·6	22·1	18·0	1·1	5·0	22	22·1
Cowpea chaff	7·7	14·5	36·7	24·3	4·0	12·8	9·4	26·0	10·2	2·1	4·4	22·4	20·2
Lucerne hay	9·9	19·6	43·0	16·3	1·4	9·8	14·5	29·7	7·4	·7	2·7	21·4	13·1
Prairie grass	8·9	13·7	37·6	31·7	1·6	6·5	7·8	24·0	19·0	·9	5·8	21·3	24·4
Barley straw	14·2	3·5	39·1	36·0	1·5	5·7	·9	21·2	19·8	·6	47	25·6	212
Oaten straw	9·2	4·0	42·4	37·0	2·3	5·1	1·2	22·5	21·5	·9	38·4	23·4	159
Wheat straw	9·6	3·4	43·4	38·1	1·3	4·2	·8	11·1	21·0	·5	41·5	32·7	238
Grains, Seeds, &c.—													
Barley	10·9	12·4	69·8	2·7	1·8	2·4	8·7	64·2	·7	1·2	7·8	14·7	21·9
Corn (maize)	12·0	13·1	65·8	2·0	5·5	1·6	10·0	61·1	1·2	1·4	6·6	14·9	19·0
Cow peas	14·8	20·8	55·7	4·1	1·4	3·2	17·7	52·0	2·4	2·2	3·4	14·7	10·8
Kafir corn	9·3	9·9	74·9	1·4	3·0	1·5	7·5	69·0	·8	1·3	9·7	13·9	25·4
Linseed	9·2	22·6	23·1	7·1	33·7	4·3	20·6	12·7	4·3	29·0	4·1	10·8	9·2
Oats	11·0	11·8	59·7	9·5	5·0	3·0	9·2	46·0	2·5	4·1	6·2	16·7	20·7
Rice	12·4	7·4	79·2	·2	·4	·4	4·8	72·2	·1	·3	15·2	14·3	39·6
Sunflower seeds	8·6	16·3	21·4	29·9	21·2	2·6	13·1	19·7	17·9	18·3	6·1	12·1	14·5
Wheat, plump	11·1	14·8	67·4	3·2	2·2	1·3	11·9	54·0	1·1	1·5	4·9	16	16
Ditto, shrunk	8·3	17·1	65·8	3·5	3·0	2·3	13·7	52·7	1·2	2·0	4·8	14·1	13·9
By-Products—													
Barley and malt-combings	15·1	12·3	62·9	5·3	·5	3·9	9·8	43·5	1·8	·5	4·7	20	19·4
Bran	11·9	15·4	53·9	9·0	4·0	5·8	11·7	34·5	1·6	1·7	3·4	21·9	16·3
Brewers' grain, wet	75·7	5·4	12·5	3·8	1·6	1·0	3·9	7·8	1·5	1·4	4·2	47	49
Corn cobs	8·4	2·5	54·7	32·0	·7	1·7	·5	26·3	18·3	·6	92	15·9	381
Cotton-seed meal	9·9	47·3	22·5	3·2	12·2	4·9	40·6	13·5	1·8	11·3	1·0	20·7	4·7
Linseed meal	10·0	36·1	36·7	8·4	3·6	5·2	31·8	28·2	4·8	3·2	1·3	16·8	6·0
Oilcake, Sunlight	9·5	19·2	27·6	26·8	11·2	5·7	17·5	21·2	14·7	10·5	3·7	13·1	10·9
Peanut meal	10·7	47·6	23·7	5·1	8 0	4·9	33·9	11·6	·6	7·2	·9	18·7	5·6
Pollard	10·0	17·4	58·0	5·2	5·6	3·8	13·9	47·0	1·7	4·8	4·3	15·3	13·7
Various Foods—													
Milk	87·2	3·6	4·8	..	3·7	·7	3·4	4·7	..	3·7	3·9	68	56
Ditto, skimmed	90·6	3·3	5·3	..	·1	·7	3·1	5·2	..	·1	1·7	135	61·4
Dried blood	8·5	84·4	..	..	2·5	4·6	52·4	..	..	2·5	·1	20·9	3·6
Molasses	2·40	2·2	63·8	..	10·0	10·0	1·1	57·5	..	..	52·3	18·9	173

Pastoral.

SHELTERS FOR SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

When an engineer erects a steam plant, his first care is to provide a wind and weather proof shed around his boilers. Further, he "lags" the boiler with some non-conducting material, so that as little as possible radiation of heat shall take place. This to economise his coal.

Food is to the animal as coal to a boiler—a producer of heat—without which no animal can exist. Consequently, putting aside humanitarian principles, it is economy in food alone to provide all stock with shelter.

The above is trite and commonplace, it is true. Yet all who know the great plains of Queensland North, and Central and South, or West of the Dividing Range, know that in very few cases indeed is shelter provided for stock when it is not present naturally. The fleece—Nature's "lagging" for the sheep—is taken off, and the animal turned out into a paddock with only the posts of the wire fence to give utterly inadequate protection against blazing heat or freezing winds, according to the time of shearing. This is certainly bad business, besides being cruel to the best friend the Australian pastoralist possesses.

The pastoral business is paying well enough; everybody concerned knows that; yet there is no reason why it should not pay better, and it seems only common-sense to say that if the sheep can be kept as comfortable as possible, there will certainly be a better yield in wool and mutton than if he were neglected.

If trees cannot be grown successfully on the wind-swept plains, a few low shelter-sheds could be erected; and surely, at present prices, the industry could stand what would really be a good investment.

SEED MAIZE FOR DISPOSAL TO FARMERS.

With the object of improving the quality of Queensland-grown maize, the Department of Agriculture and Stock imported a large selection of approved varieties from the corn-growing States of the United States of America three years ago. These have since been propagated here, and a limited quantity of seed of the undermentioned is now available at 7s. 6d. per bushel, f.o r. Clifton; remittance to accompany order.

One bushel only will be supplied to each applicant.

Orders will be supplied by priority, and, in the event of prior orders absorbing the available supply of the kind required, another will be substituted, unless advice is sent to the contrary.

Delivery in August.

Care has been taken to ensure the purity of each variety.

Varieties: Early Leaming, Early Yellow Dent, Yellow Dent, Hogue's Yellow Dent.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1913.

Three thousand eight hundred and seventy-one eggs were laid during the month. The birds, as a whole, are doing excellent work. A. C. Collis is unfortunate in having four of his pullets in moult, whilst several other pens have individual birds thus affected. A. H. Padman again wins the monthly prize with 148 eggs. The following are the individual records:—

Competitors.	Breed.	May.	Total.
A. H. Padman, S.A.	White Leghorns ...	148	285
T. Fanning...	Do.	140	240
J. R. Wilson	Do.	131	238
F. McCauley	Do.	119	236
O.K. Poultry Yards	Do.	122	232
Cowan Bros., N.S.W.	Do.	102	221
Mrs. Sprengel, N.S.W.	Do.	119	219
E. A. Smith	Do. (No. 2)	110	219
J. D. England	Do.	113	202
J. F. Coates	Do.	124	199
Jas. McKay	Do.	107	193
H. Tappenden	Do.	101	191
J. R. D. Munro	Do.	91	191
J. Zahl	Do.	115	189
Moritz Bros., S.A.	Do.	115	188
Loloma Poultry Yards, N.S.W.... ...	Do.	121	181
R. Jobling, N.S.W.	Do.	123	181
Yangarella Poultry Farm	Do.	86	172
S. E. Sharpe	Do.	133	169
J. Murchie	Brown Leghorns ...	88	169
Range Poultry Farm	White Leghorns ...	128	164
D. Grant	Do.	92	162
J. Gosley	Do.	95	158
E. A. Smith	Do. (No. 1)	79	156
W. D. Bradburn, N.S.W.	Do.	91	155
Doyle Bros., N.S.W.	Do.	94	145
A. T. Coomber	Do.	79	140
R. Burns	Black Orpingtons (No. 2)	90	135
A. F. Camkin, N.S.W.	White Leghorns ...	87	133
Mrs. Bieber	Brown Leghorns ...	58	123
Mrs. Craig	White Leghorns ...	88	121
J. Andersen, Vic.	Red Sussex	68	117
R. Burns	Black Orpingtons (No. 1)	85	113
H. Hammill, N.S.W.	White Leghorns ...	77	110
A. Schbrowski	Brown Leghorns ...	68	105
C. Leach, N.S.W....	White Leghorns ...	53	103
T. Stephens, N.S.W.	Do.	64	100
A. C. Collis, N.S.W.	Do.	46	93
J. Archibald, N.S.W.	Do.	71	92
T. Fanning...	Do.	50	50
Totals	...	3,871	6,590

Horticulture.

PROTECTION OF PLANTS FROM FROST.

On this subject, Mr. A. Holton, Calliope Station, Gladstone, writes:—

In reference to the interesting letter from Mr. Welsh on the subject of "Protection of Plants from Frost," published in this month's *Q.A.J.*, in which he states that sprinkling certain plants with cold water before sunrise will obviate any ill effects from overnight frost, I wish to take exception to the explanation he gives of the processes involved, more particularly to the illustration given of the assumed analogous action of water frozen in pipes.

If the fact is as Mr. Welsh states, "that the sap in the tissues of the plants becomes frozen," then arguing from analogy the probability is that this explains the known action of frost on pines—*i.e.*, that they burst and die.

The theory so confidently advanced in his illustration of water frozen in a pipe, "that the pipe bursts or cracks *because as the ice is thawed the temperature of the water rises and it expands,*" &c., is a very common fallacy, shared by Mr. Welsh in common with many other folk. For the truth is, that exactly the opposite process takes place, viz.: that water when freezing *expands*, and per contra in thawing *contracts.*

It is in the *act of freezing that the pipe is burst,* owing to the great expansion in the volume of water which occurs during the process of solidification into ice. The burst in the pipe, and consequent leakage, is—generally speaking—only discovered when the thaw ensues, hence the prevailing misconception; both have been—rather naturally but erroneously—attributed to the effect of the thaw, the fact being, as already stated, that the latter effect is directly due to the thaw, whilst directly and indirectly the act of freezing is responsible for both.

The foregoing in no way detracts from the value of the information imparted by Mr. Welsh, and the results of the application of water to frozen pines—among other plants—should be duly chronicled. But, as you inserted the letter with practically no comment save that "Mr. Welsh's examples seem to be conclusive," you thereby set the seal of your approval both upon Mr. Welsh's observed fact and his explanations, thereby lending the great weight of your authority to the aforesaid prevalent misconception of a well-known physical law.

Tropical Industries.

THE JAVA MANGOSTEEN (Garcinia mangostana) IN NORTH QUEENSLAND.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

The history of the mangosteen at the Kamerunga State Nursery consists of occasional remarks in the journal and short references from time to time in the annual reports. These indicate a very slow growth

PLATE 74.—MANGOSTEEN TREE (GARCINIA MANGOSTANA) AT THE KAMERUNGA STATE NURSERY, CAIRNS, ABOUT 1909.

and, although ultimately successful, a most disappointing rate of progression.

The records, fragmentary and disjointed as they are, show that on 18th October, 1891, a quantity (presumably about 100) of ripe mangosteen fruit were received from the Batavian agency by the then manager, Mr. Ebenezer Cowley, from which apparently 600 seed were obtained. Of all these apparently only a comparatively small percantage germinated. The next mention is of the distribution in February, 1892, of a few (six)

plants to an applicant on the Mossman, and again in May of that year of two more, which must seemingly have been but the smallest of seedlings.

The annual report for the season ending 31st May, 1892, states that "a quantity of ripe fruit was received at the end of 1891 from Batavia and the seeds planted. I am glad to say we have a number of young plants several inches high from these seeds, and hope to be able to report favourably on them next year. In this connection it is very desirable that the local Garcinias should be added to the Nursery."

Before the middle (11th) of July, however, when the weather turns cooler, the journal contains an entry by the manager that "I notice mangosteens do not like cold. Temperature, 45 degrees Fahr.* Several have died." And again, on the 19th of the same month—"Potted twenty-four mangosteens in larger pots. Several have died recently, but some look fair. Altogether there are thirty-six looking fair." This is the first mention of the number of seedlings raised, two more of which were distributed in November, 1892. On 3rd March, 1893, the journal records—"Planted out four mangosteens. The first planted out," which must therefore be taken as the date on which the tree now bearing was planted in Field 1, Section I., of the Kamerunga State Nursery. The following annual report (for 1892-3) states:—"The mangosteen from the Dutch East Indies: This must be reported as a very slow-growing plant indeed. Plants now eighteen months old have only developed five pairs of leaves, and the plant a height of 4½ in. Notwithstanding this slow growth, most of the thirty plants look fairly healthy. Four have been planted in the open; the rest are in the bush-house. The plants are liable to a slow disease. The apex of one of the terminal leaves commences to dry; another opposite dies in the same way; this is followed by the drying up of the whole series of leaves and plant; it may be climatic influence. It has the reputation of being a very hard tree to naturalise in any country, and so far the same seems to apply here.

No mention is again made of the mangosteen until in his annual report for 1894-5, when these plants were three and a-half years old, when the manager writes—"Very little growth is noticeable in these plants, but one plant in the open looks promising and well. The balance have been detained in the bush-house, but will be planted out in the coming wet season. So little is known of the habits of this, the king of fruits, that I have had to labour somewhat in the dark in its regard. As the plants are alive, and the one outside is equal in growth to those in the bush-house, I have great hope of ultimate success."

During 1895 two more plants are recorded as having been distributed. None of these distributed seedlings (twelve in all) can be traced, and presumably shortly succumbed.

At the end of the official year, about June, 1896, it is recorded that "Specimens of this plant retained at this Nursery show very slow

*At Kamerunga it has been found from experience that on the average a minimum temperature of 45° F. in the meteorological screen is equal to about 37° to 38° F. terrestrial radiation, which is, of course, the actual temperature the plants would have to contend with

growth. The height of these plants does not exceed 2 ft. They are now four and a-half years old, grown from seed received in October, 1891. I have been enabled to plant some plants in the open, but shall at least retain one in the bush-house, and, if necessary, raise the roof of that building. Great trouble has been experienced in many of the tropical countries into which this, the king of fruits, has been introduced."

Again, a year later (annual report, 1896-7), but little progress is reported—" The plants of this fruit (mangosteen) have not yet attained the height of 3 ft. even in the bush-house. In the open, the best of them measures only 2 ft. This is a plant which evidently requires shade and moist heat. In all tropical countries where it has been introduced it has proved tardy of growth and requires great care.. With us this will be augmented, as the thermometer in winter descends to 42 degrees Fahr."

There is no mention of these interesting trees for the two years following, during which time the number of plants in the bush-house seem to have been reduced to two, though no record of any further distributions is to be found. Presumably they gradually succumbed, though the two left in the bush-house during these two years put on 1 and 2 ft. in height respectively, for we read in July, 1899—" Two trees in the bush-house have attained a height of 5 ft. and 4 ft. respectively, while those in the open vary from 18 in. to 2 ft. This is a slow-growing tree, but thrives best under much the same conditions as cocoa, needing a heavy moist soil rather than a light dry one. The fruit, if it can be successfully grown, will probably prove both popular and profitable."

A year later again (July, 1900), while no measurements are given, it is reported—" The growth of these trees has been somewhat disappointing. The two trees in the bush-house continue to grow, but those in the field (No. 1) remain stunted and sickly. The shade and humus obtained in the bush-house will account for the difference, and there is no doubt that transplanting into the new block, which will be shaded, will allow of their recovering and doing well."

About this time a new section of the Nursery was opened, of which a portion having rich alluvial sandy loam was left shaded by indigenous scrub trees and set aside for special experiment with vanilla, cocoa, pepper, cardamons, and the mangosteens, &c. Into this, towards the end of 1900, an effort was made to transplant some of the mangosteens from the field and the two from the bush-house. This year also experienced the big drought of Queensland, and all plants had a trying time. While no doubt the new site would have been advantageous, the age of the plants, their natural delicacy or the unfavourable weather following, doomed the experiment to failure. The plants so transplanted were unable to stand the process; and in July, 1901, it is recorded—" The two trees from the bush-house have been transplanted to the new clearing, but have not done well. None of these trees seem to have adapted themselves kindly to the climate or soil, and it is to be feared that the prospects of acclimatising and propagating this most excellent of fruits are not good."

How many plants were then left in the field where originally planted is not stated, and no mention occurs again until Mr. C. E. Wood, then overseer and now manager, mentioned it in his journal, under date January, 1910. At this time and for some years previously only one tree was in existence. Presuming this to have been the biggest, as it evidently was the hardiest, of those germinated in 1891 and planted in the field in March, 1893, it would be then about eighteen years old.

In July, 1899, when seven and a-half years old, it was recorded as being 2 ft. high, having averaged an increase in height of a little over 3 in. per annum; in January, 1910, ten and a-half years later, it was found to measure 6 ft. 8 in., so that, though still abnormally slow, it had nevertheless all but doubled its rate of growth.

PLATE 75.—THE SAME TREE IN 1911.
(*See* table of measurements.)

The manager records at this time that the tree did not appear to have made any growth during the previous two or three years; and the foliage was then thin and the stem bark-bound. Complete measurements were then taken and special treatment commenced to induce fruit-bearing. The bark was judiciously cut, the soil manured and mulched, liquid goat manure applied occasionally, &c., but no great improvement was shown until about May, 1911. The treatment was continued, and the tree kept watered during dry weather, and in the cold season a shade was erected over it.

The manager records—" When starting to treat this tree in 1910 I allowed myself three years' treatment to bring to flowering and fruiting—that is, if the tree ever intended flowering in this country."

The increases of growth under this special treatment are well indicated in the following table, wherein the uniform development of all parts is noticeable:—

MEASUREMENTS OF TREE OF GARCINIA MANGOSTANA AT THE KAMERUNGA STATE NURSERY, CAIRNS, NORTH QUEENSLAND.

—	Jan., 1910.	11th May, 1911.	14th Dec., 1911.	8th May, 1912.	16th Feb., 1913.
Girth at base	8 in.	8½ in.	9¼ in.	10 in.	11 in.
Girth 3 ft. from ground ...	5½ in.	6 in.	6½ in.	7 in.	8 in.
Height of tree	6 ft. 8 in.	8 ft. 5 in.	9 ft. 2 in.	9 ft. 10 in.	11 ft. 0 in.
Spread of branches east and west	5 ft. 4 in.	7 ft. 9 in.	7 ft. 0 in.	8 ft. 9 in.	9 ft. 4 in.
Spread of branches north and south	...	...	6 ft. 3 in.	7 ft. 0 in.	8 ft. 6 in.

Subsequent to May, 1911, a branch on the eastern side was found to be spreading too far, giving the tree an unbalanced effect; this was cut back, which will account for the smaller measurements in December, 1911.

On 27th January, 1913, flower buds were observed beginning to swell on several branchlets. Three days later a cyclone was experienced, which stripped most of the leaves from one side (south) of the tree and also damaged a number of buds on that side, which dried and fell off. Sixteen flowers opened safely and well, however, between 1st and 19th February, all of which set. At the time of writing the young fruit are rapidly increasing in size, promising, as already stated, that this plant will ultimately, and after much tribulation, prove the first and only one, from 600 seed, to mature its fruit in North Queensland.

Regarding other importations of seed or plants than those through the tropical institution of Kamerunga records are exceedingly scarce. Undoubtedly seed has been obtained in North Queensland from time to time previous to the bringing into force of "*The Diseases in Plants Act of* 1896," under which any importations of seed from countries where coffee leaf disease (*Hemileia vastatrix*) existed was prohibited. Seed has been introduced as far back as 1854 in Southern Queensland and New South Wales, and plants raised therefrom distributed by the various Botanical Gardens and the Acclimatisation Society. Some of these, no doubt, came North, but no definite instance of the successful propagation of trees so obtained can be traced.

Many rumours of the existence of plants of the true mangosteen have been received, and in nearly every case they have, on investigation, proved to be *G. xanthochymus* or some other species, or at least the matter was left in such grave doubt that only the development of the plant itself could prove the identity claimed for it, which development did not eventuate. Many could not be convinced that they had not got *G. mangostana.* They had applied, they said, to some neighbour, friend, or even nursery seedsman, for a plant of "Mangosteen," and got one. As no botanical or scientific name or description was mentioned in such transactions, and the name "Mangosteen" is, or has been, commonly applied in this country to any species of the genus, the donor or vendor

is as certain and satisfied that he has supplied what was wanted as the purchaser or recipient is that he has received what he expected!

Of trees of undoubted parentage, or of sufficient size to determine beyond question, there are but few in North Queensland. As already stated, not one of the dozen or so true seedlings distributed from Kamerunga State Nursery can be now traced with certainty. Two plants exist at Port Douglas that seem true. These are in the tropical orchard of Mr. J. D. Johnson, and are not more than 5 ft. high. What age these are, it is impossible to say. If they originated from Kamerunga they must be at least as old as the tree now bearing there—viz., twenty-two years, which is possible, or they may have come from the South later, but record of their origin is not available. Several plants are said to have been obtained by Mr. J. R. Norris, of Mackay, and planted in his orchard, which were subsequently cut down by mistake and replaced

PLATE 76.—THE SAME TREE IN 1913.
(Showing development and growth.)

by others of the kind. There would, however, seem some doubt of the species by which the originals were replaced, and those he has now are not, I understand, in this gentleman's opinion, *G. mangostana*. It is said a thriving though young plant which is unquestionably *G. mangostana* is owned by Mr. Banfield, of Dunk Island. If so, I trust that he will be successful in bringing it to fruition and that something more will be heard of it. It is hoped that the present articles will awaken, or reawaken, interest in this fine fruit, and the writer will be glad to hear from any who have, or have had, specimens of it, and to hear of their experiences with it in Northern Queensland.

In Southern Queensland, outside of the tropics proper, the climate has afforded but little hope of success with the mangosteen. It has,

however, been tried on more than one occasion, plants having been raised from seed not only in the Botanic Gardens and Acclimatisation Society's Gardens of Brisbane, but the Botanic Gardens of Sydney, New South Wales, also, from time to time.

Mr. J. F. Bailey, Director of the Brisbane Botanic Gardens, in his presidental address to the Royal Society of Queensland on the 26th February, 1910, on the subject of "The Introduction of Economic Plants into Queensland," said of this fruit (*Garcinia mangostana*)—"M. C. O'Connell, of Port Curtis, and a gardener in Brisbane received plants of this fruit, which is described as the most delicious in existence, from the Sydney Botanic Gardens in 1854. Although it has since been distributed on numerous occasions by the Brisbane Botanic Gardens and the Acclimatisation Society, so far has not met with success, owing no doubt to the intense humidity required for perfecting its growth not being obtainable even in our Northern localities. Several other species of the genus have been introduced and have fruited here, but their fruits have been of a very inferior quality."

Another factor that might have been mentioned as militating against more extensive success is the extreme difficulty experienced in successfully transplanting young plants or trees, and also of their transport. Some of the Southern horticulturists have, I understand, succeeded in keeping specimens alive for some years, and even inducing some growth, but I am not aware of any other instance of its having been brought to fruition in Australia. Plants sent to the Northern Territory and Papua seem to have been equally unsuccessful.

The reference, in the address quoted, to other species evidently includes *G. xanthochymus*, though it is not specifically mentioned. This must have been at least contemporaneously if not previously introduced.

THE MECHANICAL PREPARATION OF COIR FIBRE.

We have already drawn attention to the enormous waste in Papua and in the other Pacific Islands of a valuable by-product of the Coconut —the coir or husk. At all the copra-making stations which we visited in British New Guinea (Papua) we saw immense quantities of coconut husks from which the coir fibre, so valuable for rope-making, is manufactured, lying neglected, no attempt being made to convert it into a marketable commodity for which there is a great demand. This waste reminded us of the old days of cotton-growing in Queensland, when thousands of tons of cotton seed were left to rot near the ginneries, in spite of its being pointed out that cotton seed even then had a considerable market value for the purpose of oil-extraction and oilcake manufacture.

From all accounts it would seem that a boom in coconut planting has commenced in the South Seas and elsewhere, owing to the enormous

demand for "coconut butter," for which there appears to be an ever-increasing market. This means that there will be a corresponding increase in the quantity of copra produced and also in the accumulation of coconut husks. The question is: Can these be turned to profitable account by planters? From the following account of the method of production of coir fibre, by M. F. Main, published in the "Journal d'Agriculture Tropicale," Paris, for April, 1913, which we have taken the liberty of translating for the information of our many tropical readers, planters, copra-makers, &c., it would appear that even with white labour, by the aid of simple machinery, the business of coir manufacture should prove profitable. M. Main says:—

"We recently took part in a movement which has arisen in colonial circles in favour of the coconut palm, and thus were enabled to note the reappearance of devices for the exploitation of the coconut. These devices, the principle of all of which was favourable, differ very little from each other, the more so, since the further one looks into it the more do the data increase giving a larger scope of individual appreciation by those who instal them. One point common to all those devices, whencesoever they emanate, is the small importance given to coir, which is generally spoken of as being a very interesting by-product, but which is not considered in the devices either with regard to the expense of preparation or in returns from the sale of the fibre.

"This indifference may probably arise from the fact that if the preparation of copra does not demand any complicated preparation, a primitive implement and the sun comprising pretty well all the cost of manufacture, little attention is paid to the values of the material required for the manufacture of coir rope, and to the composition and method of working up this material. Furthermore, it is right to add that, in many regions—as, for instance, on the Malabar coast—coir rope is made without any aid from machinery, rope which, a few years ago, realised higher prices than the small quantity of machine-made rope placed on the market. But it must be considered that the former manufacture is destined to disappear, to be replaced by machine-made rope, which is evidently more economical and above all more regular in the work turned out. Consequently, coir represents a sufficiently important factor in the revenue of a plantation to induce the planter to consider the installation of coir-making machines.

It may be reckoned that 1,000 nuts yield on an average 90 kilos (about 198 lb.) of fibre, of which 65 kilos (143 lb.) are "brush fibre." At 45 francs (37s. 6d.) per 100 kilos (220 lb.), this represents a rough return of 175 francs (£7 5s. 10d.), plus the value of the "mattress fibre"—a total of about 200 francs (£8 6s. 8d.) per hectare (2·471 acres).

"We are pleased, therefore, to be able to place before our readers illustrations of the various machines needed for the manufacture of coir, together with precise explanations, which have been kindly supplied by the firm of Larmuth, who make a speciality of rope-making machinery.

"The first machine, Fig. 2 (Fig. 1 omitted in the article), performs the first operation of opening the nut. This, as is well known, is generally done by the natives by means of an iron spike fixed in the ground, upon which they strike the nut, to make an opening which enables them to open the nut in two or three pieces by turning it about the spike. In the machine in question, there are three serrated knives, as shown in the figure. . . . These knives seize the nut, cut it up rapidly, and it falls to the ground in three perfectly separate parts. From information received from one of our subscribers who use these machines, the day's work amounts to 14,000 nuts, which represents the labour of fourteen men, as it requires a skilled workman to open 1,000

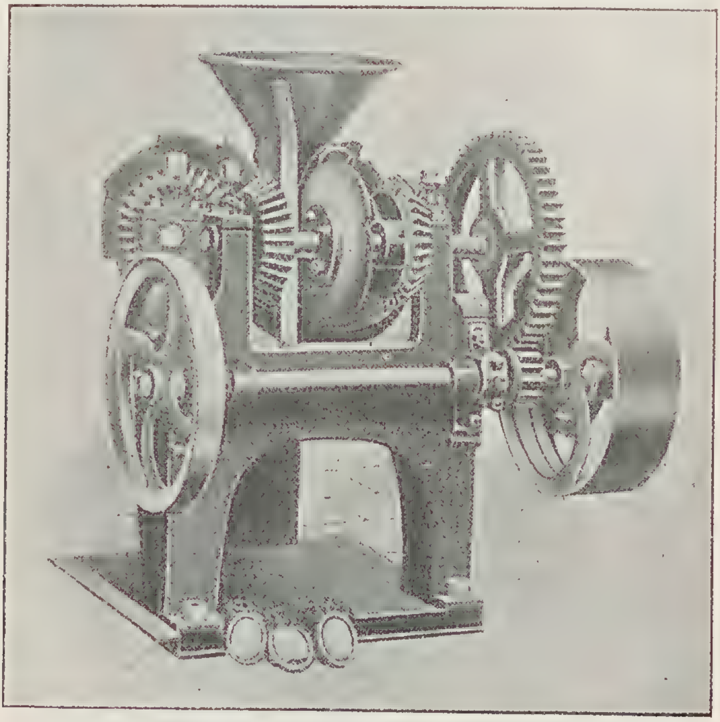


PLATE 77 (FIG. 2).—MACHINE FOR OPENING COCONUTS.

nuts a day by hand. The next operation (retting) cannot, so far, be carried out by a machine. It is considered that steeping or 'retting' not only results in softening the fibres and in facilitating their separation, but also gives them a favourable yellow appearance. This retting is a slow process, often lasting for a year, and generally requiring several months, and the various processes which have been recommended for reducing the time to a few days or a few hours do not appear, in practice, to have given such results as would bring them into general use.

"Before actual extraction, it is well to subject the husks to a crushing process, which facilitates the work by effecting a preliminary separation of the fibres from the *débris* of the retting. This is the object of the crusher (Fig. 3), which consists simply of two deeply-fluted rollers, between which the shells are passed, and whence they emerge flattened out, the fibres being now partially freed from the glutinous substance which clogs them.

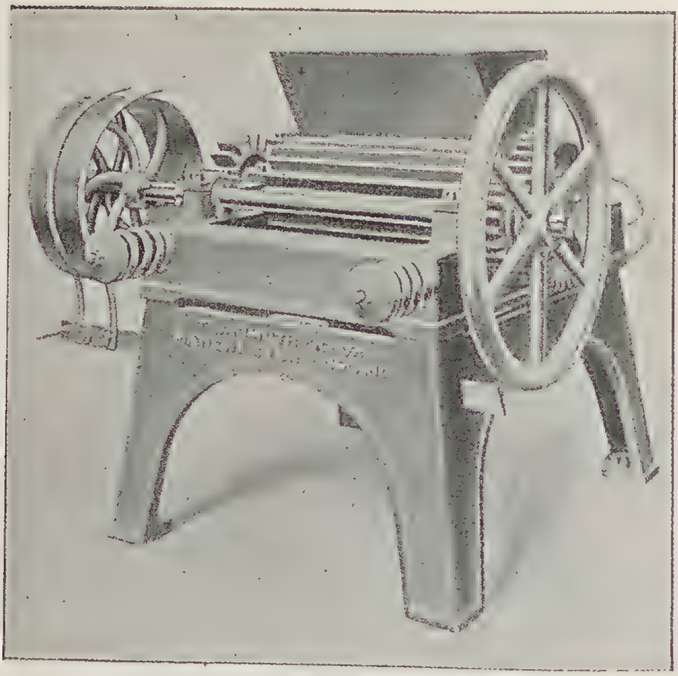


PLATE 78 (FIG. 3).—SHELL-CRUSHING MACHINE.

"Now they pass on to the Extractor (Fig. 4), when two machines are generally employed—a 'reducer' and a 'finisher.' They both

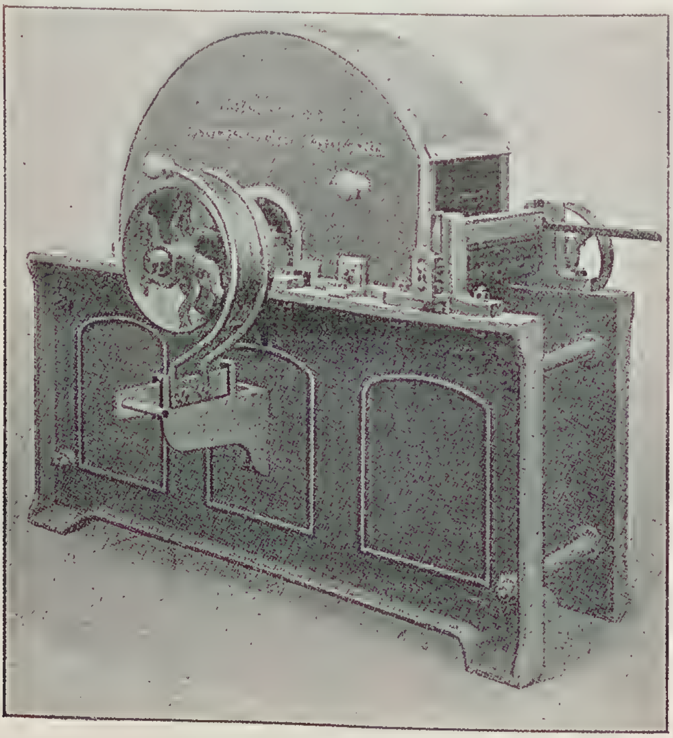


PLATE 79 (FIG. 4).—EXTRACTOR.

operate in the same manner. The workman passes the *débris* of the shells to the small rollers seen in front of the machine, which drag them in slowly, after which they come in contact with the teeth of the main roller, which tear out the short fibres, and perform a kind of combing on the long ones. As soon as more than half the shell has been subjected to the action of the roller, the workman draws it out and presents the other half to the action of the teeth. Then he passes the fibre to his neighbour, who repeats the same operation on the finishing machine, which is exactly similar to the other, except that the teeth of the latter are more closely set together. By this process the fibres are completely separated from the *débris,* and the shorter fibres remain in the hands of the workman, who passes them into the separator, a sort of inclined roller, made of a frame covered with a metallic cloth, over which the *débris* and dust pass, whilst the long fibre comes out at the end.

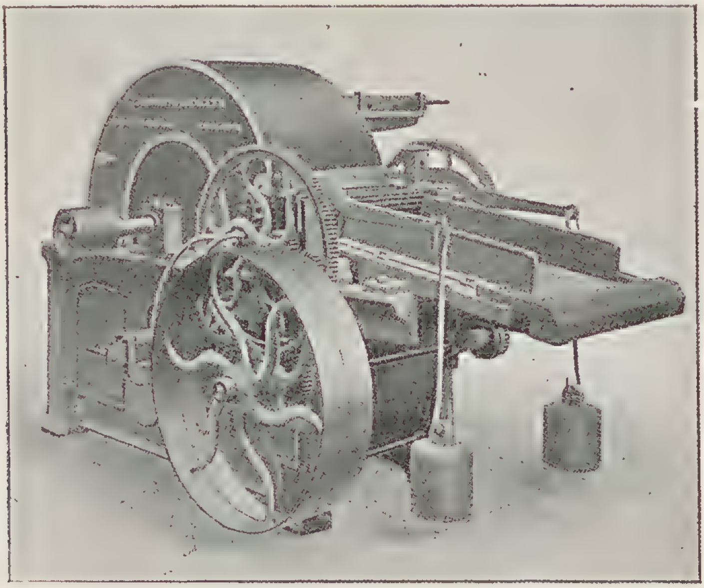


PLATE 80 (FIG. 5).—SPECIAL EXTRACTOR FOR UNRIPE FRUIT.

"When it is desired to work up nuts which are too young or incompletely mature, which are difficult to hold in the hand, and which, besides, only furnish an inconsiderable quantity of 'brush fibre,' a special extractor (Fig. 5) is used (which is minutely described by M. Main). On leaving the separator, the fibre is hung up to dry, usually in the sun. Then, if it is not intended to be spun on the spot, it is packed in bales, by hydraulic pressure, of about 200 lb. weight."

We omit the process of rope-making, as probably few planters would enter on this part of the business. To drive these machines all at once, a 20-h.p. engine would be required, for the treatment of 2,500 nuts per day, unless rope be made, when a 28-h.p. engine would be needed. For 5,000 nuts, from 28 to 44 h.p. must be obtained. The machines are all very simple to work, and require very slight regulating.

COVER AND SECONDARY CROPS FOR COCONUT PLANTATIONS.

Mr. O. W. Barrett, Chief of Experimental Stations in the Philippines, and Mr. P. J. Wester, horticulturist, contribute some very valuable suggestions on cover crops for coconut plantations to the "Philippine Review." The subject is one as to which, of course, as usual in the planting world, there is considerable difference of opinion. Messrs. Barrett and Wester say:—

"Depending upon the soil, climatic conditions, the variety planted, and the care of the trees, coconuts do not begin to bear until in their fourth or seventh year from planting, and a full crop may not be expected until the trees are eight to ten years old. During this period the exchequer of the owner is subjected to a continual drain of "upkeep" money if the land is devoted to coconuts alone. To decrease this expense and obtain some revenue from the land during the "adolescence" of the plantation should therefore be the aim of every grower of coconuts. Secondary or "catch" crops offer a solution of the difficulty; but even the handling of these calls for experience and careful attention, and, unfortunately, no fixed rules can be laid down to fit all plantations. Cover crops are very good indeed for the health and rapid development of the coconut grove, but they cannot be expected to give a quick return *in cash* to the owner.

"For instance, from the ordinary legume cover crops, such as Lyon bean, velvet bean, mani-manihan, cowpea ('sitao'), jackbean, guar, pigeon pea ('cadyos'), ipil (*Lucœna glauca*), and madre cacao, &c., but little actual revenue can be obtained, the benefit from planting these crops consisting in the shading and enrichment of the land and the conservation of moisture, thus hastening the development of the trees. Planters who are just beginning to use cover crops should remember that the advantages derived from them are: First, they keep the surface of the soil cool and moist through the hot, dry season—a matter of very great importance to young coconuts; second, they store up nitrogen (condensed plant food) in their roots; third, their roots improve the soil physically; and, fourth, they form a natural blanket on the soil surface, which prevents the rains washing away the highly valuable dead vegetable matter accumulated there: all these points are really of much greater import than the average planter appreciates. Almost anyone can make a profit growing coconuts, but, other things being equal, the planter who employs cover crops is practically sure to win out away ahead of his neighbour who either follows the reprehensible *laisser faire* plan of letting the weeds and grass grow as they will or who tries at unnecessary expense to keep the interspaces clean.

"The proper management of cover crops is an art in itself. Briefly, the running of trailing sorts may be broadcasted in the rainy season; but the drill system is usually the most economical as to seed and care of the plants until they get well started. The shrubby species, like the pigeon pea, ipil, madre de cacao, and even the semi-shrubby ones, like the guars, the crotalarias, and cassias—all these should be planted closely in hills in rows between the coconuts. The various vines may be

rolled or cut with a disc harrow if they should get too luxuriant during the rainy season; if they climb upon the young palms too rampantly (a *good* fault, indeed) a boy with a stick may be sent along the rows once or twice a week, to poke them away. The shrubby and semi-shrubby kinds may be cut back occasionally in order to make them spread out at the bottom and shade the entire surface; a good sharp bolo in the hands of an ordinary labourer is all that is necessary for this beheading operation. The lopped-off material quickly turns into humus on the soil surface. If carefully managed there need be but very little danger from fires; some of the shallow-rooting species may die during prolonged drought and so become a menace, but the possibility of such an occurrence need never worry the planter in ordinary coconut regions. Most of the legume covers can be used either as hay or as green forage or browse for goats, pigs, and even cattle. Some kinds are also important as human foods.

"That the thrifty planter will need at least a few secondary crops goes without saying. Space forbids a full discussion of this interesting subject; but we beg to remind every coconut grower that it is his duty to raise a great part of the labourers' food as well as the animals' feed *on the plantation itself*. If due attention is paid to the ordinary principles of crop-rotation and management all or most of the following catch crops, grouped according to their uses, can and should be raised on every coconut hacienda:—First-class foods: Maize (in variety), sweet potatoes, beans (of many sorts), peanuts, pineapples, upland rices. Second-class foods: Cassava, bananas (of many kinds), papaya, roselle. Third-class foods: Millets, grain sorghums, dasheens, and yautias (aristocratic relatives of the old "gabe"), sincamas (yambeans). Forage plants: Sorghums, maize, millets, and in the rainy season and in moist soils, Guinea grass, Rhodes grass, and possibly Natal and molasses grasses. Generally speaking, none of these catch crops should be planted within 1.5 metres of the young coconuts; legumes, however, may be planted close up to the base of the stem.

"Another matter which affects the status of the coconut estate is the raising of a good supply of vegetables and fruits in good variety; a home garden and home fruit orchard not only make life pleasanter and dietetically safer for the families of the superintendents of all grades, but the surplus can always be readily disposed of either in the local markets or, in case of some sorts, among the labourers.

"The following vegetables and fruits are recommended for general culture on all coconut lands:—First-class vegetables: Tomatoes, egg-plant, lettuce, beans, pechay (Chinese cabbage), radish. Second-class vegetables: Beets, carrots, okra, peppers, turnips. First-class fruits: Mangoes, avocados, citrus fruits (orange, mandarin, lime, calamondin, lemon, pomelo), the anonas (custard-apple, sugar-apple, soursop, cherimoya, and the new hybrids), carissa, carambola, and balimbing. Besides the general-purpose collection of fruits and vegetables, every well-managed estate will have an experimntal or trying-out collection; this not only breaks the hum-drum routine of estate work and adds a zest to life, but experiments (even negative ones) almost always *pay* in the long run—to say nothing of the fun."

JUTE.

In a recent article on bast fibre plants which we have received from Mr. H. Newport, Instructor in Tropical Agriculture, Cairns, prominence is given to two introduced plants which, like *Sida retusa,* have run wild. These are the Chinese burr (*Triumfetta pilosa*), and the Pink burr (*Urena lobata*).

"Fibre from each of these, among many others," says Mr. Newport, "has been extracted at the Kamerunga State Nursery and included in the trophies at shows, Southern exhibitions, and even English and foreign exhibits, when the fine quality of the fibre so obtained was frequently commented on. The cheapness with which these fibre plants could be raised owing to the very slight cultivation required, and also the possibility of the utilisation of the wild growth, has frequently been pointed out by the officers of the Department to Northern settlers. No serious attempt at cultivation has, however, been undertaken, though several desultory attempts at utilisation of the self-sown and wild-grown fibre plants have been made from time to time. Director Joseph Campbell, M.A., of the Gossypium Park Estates, Kamma, near Cairns, finding an unusually prolific growth of these burrs on some of his waste land, recently set in hand an experimental preparation of the fibre on a fairly large and distinctly commercial scale with his aboriginal labour. A sample of the fibre obtained he sent to this Office. It was found to be clean, strong, of good lustre and fair resilience, soft in texture, and a fibre nearly allied to jute and suitable for similar purposes, viz.—twine and small cordage, but more particularly for the manufacture of hessian, bags, and sacks.

"True jute is, of course, obtained from *Corchurus capsularis* and *C. clitoris*, and possibly varieties as well as other species of the same genus. The fibre from the wild burrs of North Queensland is not, therefore, true jute, and perhaps might be called a soft hemp, but, since it so closely resembles jute in texture and appearance, and both hemp and jute have become terms implying a certain kind of fibre rather than a plant and are both, but especially hemp, applied to many and various fibres far widely differing genera of plants, the term "jute" may be used without apology in this case.

"The plants mostly used by Mr. Campbell were *Urena lobata* and *Triumfetta pilosa,* and another very similar. To obtain the fibre, these are treated in the same way as is true jute, &c. They are cut when full grown, but before they flower and seed (the bark will not strip satisfactorily once the plants seed), and are steeped for a day or two in water. Any creek or billabong will do, and it is immaterial whether the water is running or not. When steeped or retted sufficiently, it is better, if possible, to thrash the now wilted and soaked plants. The bark is then easily removed, and requires but little rubbing and washing to become free and clean. It dries quickly in the sun when a handful at a time is twisted up in hanks, and it is ready for baling and despatch.

"Mr. Campbell states that with his aboriginal labour the cost of cutting, retting, stripping, cleaning, and drying amounted to £7 per ton.

"He had some of the jute valued in Dundee at £16 per ton, to which the cost of freight, &c., would be some £4, leaving a profit of £5 per ton.

"The returns of fibre from either of these burrs are difficult to gauge, since no specific sowing has yet been undertaken and no figures of the weight of green stuff harvestable or dry fibre outturns have been obtained or recorded. From wild or self-sown areas, the returns are of

PLATE 81.—FIBRE MANUFACTURED FROM *Urena lobata* AND *Triumfetta pilosa*, AT GOSSYPIUM PARK, CAIRNS.

course most variable. The indications are that, even from a self-sown field of fairly regular growth, at least as much true jute as under normal conditions—viz., a ton of dry fibre per acre—will be obtained. Experiments to determine what may be obtained from such plots are now being carried out by Director Campbell, of Gossypium Park, Kamma.

"With white labour and such conveniences and facilities for retting, stripping, cleaning, and drying that might at little cost be erected, but which Mr. Campbell has not at present with his aboriginal labour, and a reasonable allowance for wages, it is thought that the raw "jute" might be produced for £10 per ton. The freight, &c., at £4 per ton for sending it to an European market might be saved by its utilisation in this country, the machinery for rough spinning into the coarse yarn necessary for making hessian and sacking being comparatively inexpensive, at least not involving any such expenditure as, for instance, the manufacture of sugar.

"With a difference therefore of at least £6 per ton, its preparation locally into the raw marketable article should be a sound agricultural proposition. The demand for the manufactured goods is not lacking nor the market necessary to be sought for, as in this district alone many thousands of bags are used for maize, sugar, and ores. These cost at present about 7½d. each retail, with every prospect of rising rather than falling in price. The sacking, hessian, and bags used here are almost entirely imported from India.

"When we turn to the amount of imports the figures appear incredibly large. In 1910, according to the latest "Commonwealth Year Book" available, over £1,750,000 worth of bags, sacks, and hessian were imported. In view of the steady increase of our commercial industries, this will probably increase materially yet. In paying the producer the market value of £16 per ton, therefore, there should be a margin, even under white labour conditions, to make a mill worthy of the consideration of capitalists, or feasible under the co-operative or central mill system, and incidentally save to the country an industry worth something like £2,000,000.

"In the North alone a mill like this, even if it turned out one-tenth of the amount, should be a sound business proposition."

A RUBBER COLLECTING PATENT.

"We have been informed," says the "African World," "by the well-known Hamburg firm of Carl H. Delfs that they have acquired the right to exploit a new patent, the invention of Herr v. Hassel, for the collection of rubber. The firm is about to promote an international syndicate to take over the monopoly of the patent. According to the accounts which have reached us, the invention has for its object the reduction in the cost of collecting rubber. It is a simple mechanical device which will do away with a lot of costly labour. It is generally calculated that one man is required, under present conditions, for the gathering of rubber from 200 trees, but with the Hassel mechanism one man can exploit 5,000 trees, and, under the new method, the cost of production of the rubber would be about one-third that of its present cost. Another advantage possessed by the German patent is that it tends to preserve the purity and quality of the rubber. It can also be successfully used on trees of an inferior quality."—"Rubber World."

Entomology.

INSECTS INJURIOUS TO PAPAW APPLES.

DICHOCROCIS PUNCTIFERALIS.

The following report on the above subject has been furnished to the Under Secretary, Department of Agriculture and Stock, by Mr. E. Jarvis, Assistant Government Entomologist:—

In compliance with instructions I visited the Cleveland district on the 19th instant, to investigate a disease affecting papaws, that was brought under the notice of this Department on the 14th of May.

One of the pioneer residents met me at West Cleveland, and we visited a number of orchards, in all of which the papaws showed unmistakable signs of injury. It was a sad spectacle to witness numbers of these fine trees, struck as it were by some deadly disease, with their top leaves drooping and dead, or main stems almost defoliated, and carrying a few small discoloured fruits clinging to the blackened crowns.

An examination at once revealed the injury to be due to the presence of small grubs, that were discovered to be boring the main stem, leaf-stalks, and fruit, and which proved to be larvæ of a well-known destructive insect named *Dichocrocis punctiferalis,* which, although primarily a maize pest, attacks also custard apples, oranges, peaches, loquats, cotton, and other fruits and seeds. Unfortunately this insect appears to be acquiring a greater liking for fruit, and bids fair to soon become very troublesome.

It has been previously recorded as attacking papaws, but never, I believe, to the extent now manifested.

At the beginning of this month I inspected some badly-diseased ripe oranges, and found the above insect to be responsible for the damage, and about the same time discovered it in green bananas, associated with, if not actually occasioning, symptoms somewhat resembling those caused by "gumming disease." Its occurrence in this latter fruit is especially interesting, as it has not, I believe, been hitherto recorded as a banana pest. Oranges, however, are often attacked, although it is the small green fruit that usually suffers, and injury to mature oranges is rather exceptional.

Whilst at Cleveland, in Mr. Beresford's orchard, the owner directed my attention to a grub that was damaging his granadillas by eating into the surface of the fruit and tunnelling under the rind, leaving large unsightly scars that rendered it quite unmarketable. This grub proved to be identical with the papaw pest now under consideration, and as it has not, I think, been recorded hitherto as affecting granadillas, we must add another fine fruit to the list of those already included among its food-plants.

Growers will be interested to learn that their present trouble is occasioned by a small moth that measures about an inch across the expanded wings, which are pale orange-yellow marked with numerous black dots. This insect is seldom seen in the field, as it hides carefully during the day, and lays its eggs at night.

Observations made at West Cleveland incline me to believe that the egg is deposited on the leaf-stalk, near or at its point of junction with the main stem of the tree, or more rarely on the small fruits. The larva when hatched penetrates the hollow stalk, and after feeding for a time on its succulent base bores into the crown, in which it remains until ready to pupate.

When fully grown it is nearly an inch long, the general coloration being dirty white, more or less pinkish on the back, and marked with rows of grey spots, and it has a dark-brown head and a lighter-brown patch on the first body segment.

At this stage in its life-history it leaves the crown of the papaw, and crawling to some convenient crevice on the exterior of the main stem, or among the stalks of the young fruit and buds, &c., constructs a loose silken web, underneath which it transforms into a reddish-brown pupa, from which in due time the moth issues.

The after development of this internal top-rot which characterises this disease is apparently induced by moisture and fungi that gain an entrance through the tunnels made by larvæ in the stem, early symptoms of decay appearing as dark-brown stains surrounding the entrance to such wounds, and plainly visible on the white surface of the hollow interior of the crown.

Remedial measures must necessarily be of a preventive nature, as it is too late to do much good after the larvæ have entered the leaves or main stem.

We must endeavour, therefore, to lessen the numbers of this moth by destroying both native and unprofitable cultivated food-plants that may be growing in the vicinity of papaw orchards, and, if needs be, by spraying such trees as are known to afford harbour for the pest.

It would be worth while growing a small trap-crop of some favourite food-plant such as maize, to catch the first brood of larvæ, as this would materially lessen the number of moths in succeeding broods.

Such crops should be pulled up as soon as the grubs are found to be nearing full size, and destroyed without delay.

Spraying papaws with arsenate of lead (1 lb. to 50 gallons of water) would poison newly-hatched larvæ attempting to enter the plant.

This should be applied just before the eggs are laid, and directed principally against the early broods. The arsenical would need to be very thoroughly administered in the form of a mist-like spray, so as to wet every portion of the tree.

All infested fruit, such as peaches, &c., should, where practicable, be gathered and promptly destroyed. One often notices peach trees, bearing large crops of small and comparatively worthless fruit, which,

instead of being rooted out, are allowed to serve as permanent breeding places for swarms of fruit-flies and other pests.

Some of the food-plants of this insect already recorded are as follows:—

Fruits.—Peach, papaw apple, orange, loquat, guava, custard apple, granadilla, and banana.

Cereals.—Millet, maize.

Beans.—*Canavallia indica,* cassia, Senna bean.

Flowers, &c.—Dahlia, castor-oil.

I would advise growers of papaws to avoid planting maize, unless as a trap-crop, and to be on the watch at all times for signs of the borer in the above-mentioned fruits, and also in closely related plants.

Pieces of loose webbing covered with small brown granules—which are the excreta of the larva—generally mark the entrance to its tunnel, and any external indications of this sort should receive instant attention.

In conclusion, I may add that the ravages of this insect have occasioned considerable financial loss to many papaw-growers in the Cleveland district.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	May.		June.		July.		August.	
	Rises	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6 14	5·16	6·31	5 0	6·39	5·4	6·30	5·19
3	6·14	5·15	6 31	5 0	6·39	5·4	6·29	5·19
4	6·15	5·14	6 32	5 0	6 39	5·4	6·29	5·20
5	6·15	5 13	6·32	5 0	6 39	5·5	6·28	5·20
6	6·16	5·13	6 33	5·0	6·39	5·5	6·27	5·21
7	6·16	5 12	6 33	5 0	6·39	5·6	6·26	5 21
8	6 17	5·11	6·33	4·59	6 39	5·6	6 26	5·22
9	6 18	5·10	6·34	4·59	6 39	5·7	6·25	5·22
10	6·18	5 10	6 34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6 23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6 22	5·24
13	6·20	5·8	6 35	4 59	6 38	5·8	6 22	5·24
14	6 20	5·7	6 36	4 59	6·38	5·9	6 21	5 25
15	6 21	5·7	6·36	5·0	6 38	5·9	6 20	5 25
16	6·22	5·6	6·37	5 0	6·37	5·10	6·19	5·26
17	6·22	5 6	6 37	5·0	6·37	5·10	6·18	5·26
18	6 23	5·5	6·37	5 0	6 37	5·11	6·17	5 27
19	6·23	5 5	6 37	5·0	6 37	5·11	6·16	5·27
20	6·24	5·4	6 37	5·0	6·36	5·12	6 15	5·28
21	6·25	5·4	6·38	5 0	6·36	5·12	6·14	5·28
22	6·25	5 3	6 38	5·0	6·36	5·13	6 13	5·29
23	6 26	5 3	6·38	5·1	6·35	5·13	6·12	5·30
24	6 26	5·3	6 38	5·1	6 35	5·14	6·11	5·31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5 31
26	6·27	5 2	6·39	5·1	6 34	5·15	6 9	5·31
27	6 28	5·2	6·39	5·2	6 33	5·15	6·8	5·32
28	6·28	5·1	6·39	5 2	6·33	5 16	6·7	5 32
29	6 29	5·1	6 39	5·2	6 32	5·16	6·6	5·32
30	6·29	5 1	6 39	5 3	6·32	5·17	6·5	5·33
31	6 30	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H. M.
6 May	●	New Moon	6 24 p.m.
13 „	☾	First Quarter	9 45 „
20 „	○	Full Moon	5 18 „
28 „	☽	Last Quarter	10 14 a.m.
5 June	●	New Moon	5 57 a.m.
12 „	☾	First Quarter	2 37 „
19 „	○	Full Moon	3 54 „
27 „	☽	Last Quarter	3 41 „
4 July	●	New Moon	3 6 p.m.
11 „	☾	First Quarter	7 37 a.m.
18 „	○	Full Moon	4 6 p.m.
26 „	☽	Last Quarter	7 59 „
2 Aug.	●	New Moon	10 58 p.m.
9 „	☾	First Quarter	2 3 „
17 „	○	Full Moon	6 27 a.m.
25 „	☽	Last Quarter	10 18 „

Vegetable Pathology.

ANALYSES OF VARIETIES OF PRICKLY PEAR GROWING IN QUEENSLAND.

By J. C. BRUNNICH AND F. SMITH.

As the utilisation of prickly pear is being brought forward from time to time, a record of the analyses of the principal varieties, of the leaves and of the fruits, will be of interest.

There can be but little doubt that prickly pear leaves could be utilised as a stock food to a much larger extent, if properly prepared by burning off the spines and chaffing the leaves and mixing with a fair amount of roughage (straw, bush hay, &c.) and a small amount of a more nitrogenous food, like cotton-seed meal, linseed meal, oilcake, or peanut meal. Under such conditions a cow could safely consume up to 1 cwt. of prickly pear per day and live practically without water.

The analyses of our pear, both of plant and fruit, approximates closely with the analyses published in America of prickly pear grown in Texas.

If we consider the enormous quantities of pear growing on some of our heavily-infested localities, which may be roughly estimated to weigh from 400 to 600 tons per acre, it becomes quite possible that some of its constituents, although present only in such small amounts, may be eventually utilised to pay a share of the expense for clearing. Using the fibre, of which prickly pear contains from 1 to 2 per cent. only, appears the most promising, as there is a ready market for this class of fibre, and the soil would not be robbed of valuable mineral constituents, which a utilisation of the ash would bring about. It looks very tempting to make use of the potash in the ash, which amounts to about 3 per cent. of the green plant, yielding therefore about 1 ton of potash per acre from a crop of 400 tons, but the removal of such an amount of potash, which was collected from the soil for years by the growing plant, would be a serious drawback if this cleared land has to be utilised for cultivation afterwards.

ANALYSES OF PRICKLY PEAR.

GREEN PLANT.

Variety.	Moisture.	Total Dry Matter.	Crude Ash.	Proteins = Protein N × 6·25.	Crude Fat.	Fibre (König).	Fibre (Acid-Alkali).	Pentosans.	Water Soluble.	Alcohol Ppt. (Galactan).	Water Soluble Ash.	Total Sugars (as Dextrose).	Water Soluble Nitrogen.	Total Nitrogen.	Protein Nitrogen.
Spiny Pear (*Op. Dilbii*), Gayndah	81·80	18·20	1·65	·83	·10	1·72	1·65	2·95	7·81	3·04	1·27	2·00	·076	·153	·133
Dulacca Pear (*Op. Inermis*) ..	89·70	10·30	1·58	·39	·12	·91	1·05	1·56	5·82	1·50	1·22	·64	·038	·083	·062
Giant Red Mexican (*Op. Leonera ?*), Westwood	91·50	8·50	2·65	·37	·09	1·47	2·06	·59	4·58	1·66	1·06	·50	·033	·076	·059
Emerald Tree-pear (*Nopalea Cochinelifera*)	89·50	10·50	1·80	·47	·07	1·01	1·06	1·02	3·88	1·11	·83	·76	·021	·091	·076
Helidon Tree-pear (*Opuntia Tormentosa*) (*Pubescens ?*)	93·80	6·20	1·94	·28	·10	·76	·81	·33	2·73	·68	·84	Nil	·039	·053	·045
Giant Mexican Spineless Variety (Brisbane, 1906)	94·37	5·63	1·53	..	..	..	·80	·66	2·36	..	·96	·38	·047	·079	..
Dulacca Pear (normal growth, 1912)	86·3	13·7	1·49	..	..	..	..	..	..	..	..	..	..	·051	..
Du acca Pear (abnormal growth)	81·1	18·9	1·23	..	..	..	..	..	..	..	..	..	..	·058	..

AIR-DRY PLANT.

Variety.	Moisture.	Total Dry Matter.	Crude Ash.	Proteins = Protein N × 6·25	Crude Fat.	Fibre (König).	Fibre (Acid-Alkali).	Pentosans.	Water Soluble.	Alcohol Ppt. (Galactan).	Water Soluble Ash.	Total Sugars (as Dextrose).	Water Soluble Nitrogen.	Total Nitrogen.	Protein Nitrogen.
Spiny Pear (*Op. Dilbii*), Gayndah	7·90	92·10	8·36	4·22	·54	8·72	8·35	14·92	39·50	15·40	6·43	10·11	·385	·774	·674
Dulacca Pear (*Op. Inermis*) ..	7·50	92·50	14·29	3·52	1·11	8·13	9·42	14·09	52·40	13·47	10·95	5·74	·341	·745	·562
Giant Red Mexican (*Op. Leonera ?*), Westwood	3·75	96·25	29·99	4·23	1·00	16·0	22·46	6·44	49·80	18·80	11·55	5·45	·360	·858	·675
Emerald Tree-pear (*Nopalea Cochinelifera*)	3·53	96·47	16·57	4·39	·75	9·29	9·78	9·41	35·65	10·20	7·62	6·98	·193	·842	·702
Helidon Tree-pear (*Opuntia Tormentosa*) (*Pubescens ?*)	3·58	96·42	30·31	4·39	1·58	11·82	12·60	5·20	42·46	10·57	13·62	Nil	·609	·829	·702
Giant Mexican Spineless Variety (Brisbane, 1906)	0·00	100·00	27·2	..	..	..	14·15	..	41·9	..	17·1	6·7	·83	1·41	..
Dulacca Pear (normal growth, 1912)	0·00	100·00	11·10	..	..	..	..	..	..	..	..	..	..	·382	..
Du acca Pear (abnormal growth)	0·00	100·00	6·69	..	..	..	..	..	..	..	..	..	..	·315	..

ANALYSES OF PRICKLY PEAR FRUIT.

Variety.	Seed.	Peel.	Edible Portion.	Composition of Edible Portion. Total Solids.	Soluble Solids.	Protein = N × 6·25	Acidity of Juice, as H_2SO_4	Polarisations. Direct.	Polarisations. Inverted	Polarisations. Temperature.	Sucrose by Polarisation.	Sucrose by Reduction.	Total Sugars as Dextrose.	Total Ash.	Soluble Ash.	Alkalinity of Sol. Ash as K_2CO_3	Alcohol ppt. (Galactan).	
Spiny Pear (*Op. Dilbii*)	11·0	19·6	69·4	10·45	7·98	·662	1·41	+1·3	−1·5	28° C.	2·15	1·93	2·29	1·05	1·00	·304	·70	Fruit uniformly red to epidermis. Taste sharply acid. Mucilaginous.
Dulacca Pear (*Op. Inermis*)	26·5		73·5	12·40	9·54	·316	·85	−2·5	−2·5	26° C.	Nil	·36	5·66	1·50	1·37	·635	·50	The best sample of those examined. Fruit red coloured to epidermis. Taste sweet and not over acid. Mucilaginous.
Giant Red Mexican (*Op. Leonera ?*) ..	6·0	23·4	70·6	9·30	6·94	·265	·32	+·8	−·4	26·5° C.	·91	·52	3·55		·76	·550	·68	Fruit red coloured. Taste sweet, insipid, and mucilaginous.
Emerald Tree-pear (*Nopalea Cochinelifera*)	..	..	..	..	Fruit small and inedible.													
Helidon Tree-pear (*Op. Tormentosa*) (*Pubescens*)	..	..	..	..	Only few fruit received. Green in colour. Flesh red. Taste insipid. Probably very low percentage of sugar and acidity.													

Chemistry.

ANALYSES OF FERTILISERS.

By J. C. BRÜNNICH, F. SMITH, AND A. T. JEFFERIS.

Since the introduction of "*The Fertilisers Act of* 1905" it has been customary to check the composition of all our commercial fertilisers by getting our inspectors to collect once or twice a year samples from all dealers, and to have these samples analysed at our Agricultural Laboratory.

Appended in tabulated form are the results of **analysis of fertilisers** taken by our inspectors under the Act, or submitted for analysis by manufacturers in the State. The table will inform agriculturists of the nature and composition of various forms of fertilising materials procurable upon the market.

In accordance with the Act, every dealer, manufacturer, importer, or agent who deals in fertilisers for the purposes of trade is required to register each year, giving the names or brands of fertilisers dealt in by him. We have now fifty-eight registered dealers in our State. Upon the sale of any fertiliser the seller must supply to the buyer an **invoice certificate** signed by the seller or his agent, stating full name and place of business of the seller, trade mark, brand, or other sign used to identify such fertiliser; quantity of the fertiliser or net weight in lb.; and the composition of the fertiliser, giving the respective amounts of nitrogen, phosphoric acid, and potash contained therein. Such a certificate can be attached in form of a label to each bag or package, or it may be supplied separately in form of printed slips, but the **bag must be distinctly branded** with the number of net pounds of fertiliser in the bag or package, and the figure, trade mark, or sign under which the fertiliser is sold.

The latitude allowed under the Act, in any **deficiency** in the composition, in order to allow for slight variations in manufacture, is a fairly liberal one, amounting to 5 per cent. of the total nitrogen or of potash certified to be present, if the fertiliser contains not less than 10 per cent. of nitrogen or potash, and 7 per centum of the total phosphoric acid certified to be present, if the contents of phosphoric acid are not under 15 per cent. In the case of fertilisers containing smaller amounts of fertilising ingredients, less than 10 per cent. of nitrogen or potash, and less than 15 per cent. of phosphoric acid, the amounts of deficiency allowed are—nitrogen and potash ½ per cent., and phosphoric acid 1 per cent.

On the whole, it may be stated that the composition of the fertilisers agrees fairly well with the guaranteed amounts. In a few cases where the analysis shows a deficiency, outside the limits allowed by the Act, the guaranteed amounts are shown in italics in the column for remarks, and the amounts actually found in heavy type in the tables.

Hitherto great confusion has existed through stating the composition of fertilisers in various ways, giving, for instance, phosphoric acid as bone phosphate, tricalcic phosphate; nitrogen as ammonia and ammonium sulphate; potash as potassium sulphate and potassium chloride, &c. All such statements only mislead the farmer, and to avoid this, the Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **nitrogen** (N), **potash** (K_2O), and **phosphoric acid** (P_2O_5).

The conversion of the amount of one compound into another is very simple, and as many manuring formulæ contain the old denominations, I will give here a table for such conversion:—

Amount of—		Multiplied by—	Gives the Corresponding Amount of—
Ammonia	... NH_3	0·824	Nitrogen, N
Ammonium sulphate	$(NH_4)_2SO_4$	0·212	Nitrogen, N
Sodium nitrate (Chili saltpetre)	... $NaNO_3$	0·165	Nitrogen, N
Potassium nitrate (saltpetre)...	... KNO_3	0·139	Nitrogen, N
Nitrogen	... N	1·214	Ammonia, NH_3
Nitrogen	... N	4·714	Ammonia sulphate
Potassium sulphate	... K_2SO_4	0·541	Potash, K_2O
Potassium chloride	... KCl	0·631	Potash, K_2O
Potassium nitrate	... KNO_3	0·466	Potash, K_2O
Potash	... K_2O	1·850	Potassium sulphate
Tricalcic potash	... $Ca_3P_2O_8$	0·458	Citrate insoluble — Phosphoric acid P_2O_5
Monocalcic phosphate... ...	$CaH_4P_2O_8$	0·607	Water soluble — Phosphoric acid P_2O_5
Tetracalcic phosphate... ...	... $Ca_4P_2O_9$	0·391	Citrate soluble — Phosphoric acid P_2O_5
Limestone, marble	... $CaCO_3$	0·560	Lime, CaO
Gypsum	... $CaSO_4$	0·411	Lime, CaO

It will be noticed in this table, and also in the table of analyses, that **phosphoric acid** appears under three different headings—**water soluble, citrate soluble,** and **citrate insoluble phosphoric acid.** A short explanation of these terms will not be out of place.

In bones, and in most of the mineral phosphates, phosphoric acid exists in combination with lime, in the form of a calcium phosphate: **Tricalcic phosphate** which is insoluble in water and in citric acid solutions, but soluble in mineral acids. On account of this insolubility the action of bone manure and mineral phosphates is exceedingly slow, and may extend over many years. The finer the bones or the phosphates are crushed or powdered the quicker will be the action, and for this reason the fineness of the bone meal is of importance, and should be stated.

When strong sulphuric acid is allowed to act on this insoluble tricalcic phosphate, part of the lime combined with the phosphoric acid is withdrawn, lime sulphate or gypsum being formed and the phosphoric acid is left in the form of **monocalcium phosphate.**

$Ca_3P_2O_8$	+	$2H_2SO_4$	=	$2CaSO_4$	+	$CaH_4P_2O_8$
Bone phosphate or tricalcic phosphate.		Sulphuric acid.		Gypsum.		Monocalcium phosphate or superphosphate.

This new compound is soluble in water, and therefore readily available to the plants, but on account of the special process of manufacture it is the most expensive form of phosphoric acid in our fertilisers. The superphosphate is generally manufactured from steamed bones, bone ash, and mineral phosphates. Mineral phosphates containing a high amount of iron or alumina are not suitable for the manufacture of superphosphates, because these bases readily recombine with this acid phosphate,

to form again insoluble phosphates, called reduced or reverted phosphates. A similar change would take place if lime were added to superphosphate, and also in soils containing a large amount of lime, a **dicalcium phosphate,** $Ca_2H_2P_2O_8$, may be formed, which is insoluble in water, but soluble in citric acid solutions. Another form of a lime phosphate is found in basic slag or Thomas phosphate—namely, **tetracalcium phosphate,** $Ca_4P_2O_9$ which also is insoluble in water, but soluble in saline solutions, particularly such which contain salts of citric acid. These last two compounds are, therefore, classed as citrate soluble phosphoric acid, which is fairly readily absorbed by the plant roots, and, therefore, comes close in its value to the water soluble phosphoric acid. Basic slag is an artificial product, and should be ground as fine as possible, and a good sample of this fertiliser should nearly all pass through a sieve having 100 meshes to the linear inch. Thomas Phosphate is one of the cheapest and best sources to supply phosphoric acid; it is of particular value to sour lands, deficient in lime but rich in humus.

The amount of citrate soluble phosphoric acid is generally determined in basic slag only; and in many instances the phosphoric acid, given as citrate insoluble in the accompanying table of analyses, may contain small amounts of citrate soluble phosphoric acid.

Nitrogen is the most expensive of all the fertilising ingredients of a manure, and is chiefly supplied in form of **nitrate nitrogen,** as in Chili saltpetre, or in form of **ammonia salts,** as in ammonium sulphate, or in form of organic nitrogen, as in blood, meatworks manure, &c. Nitrate of soda is a very quick-acting manure; nitrogen in the form of nitrate is in the most available form, but nitrates are not readily retained or absorbed by the soil, and, therefore liable to be washed away by heavy rains. Nitrogen in ammonium sulphate is not in such an available form, as it has to be changed into nitrates by the process of nitrification. Favourable conditions and lime salts are necessary for this process, and in soils very deficient in lime this manure, therefore, may give poor or no results. Ammonium salts are retained and absorbed by the soil, and losses in the drainage water are not to be feared.

Of particular interest are the samples of **nitrate of lime,** and **nitrolim** or **calcium cyanamide,** of which large quantities are being imported.

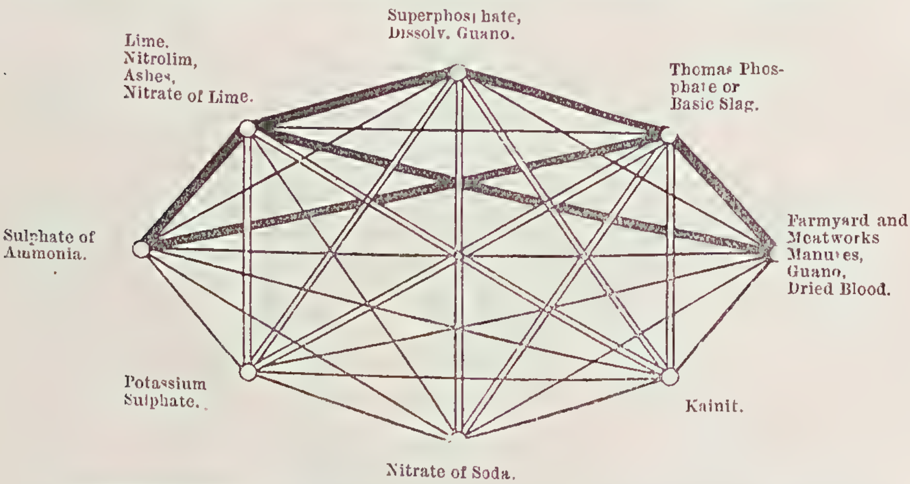
These artificial fertilisers, which are really produced from nitrogen in the air, have given excellent results in a very large number of manuring trials, conducted the last three or four years, all over the world. I believe that our soils, of which a great number are rather deficient in lime, will derive particular benefit from these nitrogenous manures. The form of nitrogen in nitrolim is apparently nearly as available as the nitrogen of nitrates, much quicker in action than ammonia nitrogen, and not depending on the presence of lime in the soil. Nitrate of lime has the great advantage over nitrate of soda of not draining so easily through the soil. Nitrate of soda rather tends to exhause soils, and spoils their physical conditions by depriving them of the lime, which faults are prevented by using nitrate of lime. Nitrolim is a very fine slate black powder, not liable to cake. As already stated, the action of this manure

is only slightly slower than that of nitrates, and the large amount of lime (up to 50 per cent.) which it contains is in itself a great advantage. These new manures have already been found to be of great value by cane, pineapple, and banana growers, and market gardeners.

Potash is generally used in the form of potassium sulphate. The chloride and kainite are as a rule not suitable to our soils.

In studying the composition of the mixed fertilisers on the table of analyses, it will be noticed that in many cases the amounts of phosphoric acid are rather high as compared with the amounts of nitrogen and potash. For this reason I generally recommend farmers to make their own mixtures from the pure concentrated manures, according to the requirements of their soil and crops, but excellent mixtures of artificial fertilisers suitable for various crops may be obtained from several firms.

When **mixing fertilisers** together, such mixtures must be avoided which would lead to decomposition, which, for instance, would take place if ammonium sulphate was mixed with lime or with Thomas phosphates, superphosphate with lime; or which may cause caking, like mixing kainite with Thomas phosphate. A very simple guide for the mixing of manures is given in the accompanying diagram, devised by Dr. Geekens, which I slightly modified, however, to apply to our local conditions.



Manures joined by a *heavy black line* should *never be mixed* together; those connected by a *double line* must only be *mixed immediately before use*; and those joined by a *thin single line* may be safely *mixed* together *at any time.*

It is a matter of extreme difficulty to fix the monetary value of a manure, as so many factors influence the value. Cost of manufacture and mixing, bagging, rebagging, labelling, loss during storages, deterioration and decomposition on keeping, carriage and freight, &c., have to be taken into consideration. Again, in many cases the value derived from the chemical composition does not represent the actual value of the fertiliser, which depends upon many causes, local conditions, and requirements.

Some method of comparison is absolutely necessary, and for this purpose it is customary to use **unit values**, which are the cost price of

1 per cent. per ton of the various fertilising constituents, or actually the cash value of 22.4 lb. of each ingredient. For instance, in a sulphate of ammonia, costing £15 per ton, containing 20.68 per cent. of nitrogen, the unit value of nitrogen would be $\frac{15 \times 20}{20{\cdot}68} = 14{\cdot}5\text{s.} = 14/6.$

The following **unit values** were approximately fixed for the calculation of the **manurial value per ton in Brisbane:—**

		s.	d.
Nitrogen ..	as nitrate	16	0
	in ammonium salts	14	6
	in blood, fine bone, &c. ..	14	6
Potash ..	as sulphate	5	6
	as chloride	5	0
Phosphoric acid	water soluble	5	3
	citrate soluble	4	0
	Insoluble as in fine bones ..	3	0

As an example we will calculate the value of the mixed fertiliser No. 297, "Hasell's Maize Manure" of the Farmers' Fertilisers Corporation, Ltd., which is guaranteed to contain 15.75 per cent. water-soluble phosphoric acid, 2.25 per cent. of nitrogen, and 1.75 per cent. potash. By analysis we find that this mixture contains 16.01 per cent. water-soluble acid, .59 per cent. insoluble phosphoric acid, 5.44 per cent. potash, and 2.46 per cent. of nitrogen, and the value per ton is calculated as follows:—

N	2.46	×	14s. 6d.	=	35.7s.
K_2O	5.44	×	5s. 6d.	=	29.9s.
Water sol. P_2O_5	16.01	×	5s. 3d.	=	84.0s.
Insol. P_2O_5	.59	×	3s.	=	1.8s.
					151.4s. = £7 11s. 5d.

The advertised price of this manure is £6 15s. per ton, free on truck or steamer at Newcastle.

On the whole, it may be stated that these comparative manurial values fairly well represent the market value, if the manures are purchased on a large scale. It is, of course, quite impossible to get manures in small lots of 1 or 2 cwt. at this price, particularly such manures as superphosphate and nitrate of soda, which require frequent rebagging.

Farmers have the means in their own hands to obtain cheap and reliable fertilisers—they simply have to co-operate and order large quantities, a few months ahead, and in this case the fertilisers will be obtained just as cheaply here in Brisbane as in Sydney or Melbourne.

Of course, for our Western and Northern farmers the freight on manure will considerably raise the cost, but even in these cases considerable saving will be effected on ordering large quantities, and all manure vendors will make special quotations for such orders.

In order to encourage the use of fertilisers, and more particularly to induce experimenting on the part of our agriculturists, I give herewith a table of the **approximate manurial requirements of various crops** in lb. per acre:—

MANURIAL REQUIREMENTS IN LB. PER ACRE.

—	Nitrogen.	Phosphoric Acid.	Potash.	Lime.
Bananas	30— 60	50—80	30—160	56
Barley	20— 40	20—53	50— 95	30
Barley, Brewers'	15— 20	30—65	60— 95	30
Beans	0— 27	20—56	75—130	70
Cabbages	100—200	50—70	50—150	150
Carrots	50— 70	15—25	40— 75	56
Cauliflowers	100—150	30—50	30— 60	56
Citrus Fruit	40— 80	30—40	40— 80	40
Corn	20— 80	20—53	50—110	30
Cotton	20— 30	30—60	15— 30	70
Cucumbers	30— 56	20—36	50— 72	20
Lucerne	0— 10	40—70	65—100	140
Mangolds	50— 80	30—70	100—160	56
Meadowlands	50— 75	20—30	80—110	40
Onions	60— 81	20—36	50— 80	56
Peas	0— 13	20—56	56—100	70
Pineapples	50— 75	50—75	100—150	70
Potatoes	20— 53	20—50	67—100	30
Rape	50— 70	40—70	60— 80	80
Sisal Hemp	10— 20	20—40	50— 70	50
Sorghum	30—100	30—60	70—150	30
Sugar-cane	30— 80	20—60	50—100	50
Tobacco	50—140	50—90	80—150	70
Tomatoes	30— 50	50—80	50— 80	30
Turnips	90—112	20—33	100—150	80
Wheat	10— 40	15—56	20— 65	30

From this table the necessary amounts of fertilisers to be applied per acre may be easily calculated. We take, for instance, Cabbages, which require a heavy application of manure, and wish to calculate the smallest amounts required per acre on an average class of soil.

The 100 lb. of nitrogen can be supplied by application of 485 lb. of ammonium sulphate; or 790 lb. of dried blood; or 630 lb. of nitrate of soda.

The 50 lb. of phosphoric acid can be supplied by 280 lb. of superphosphate or 200 lb. of bonemeal.

The 50 lb. of potash would be supplied by 100 lb. of sulphate of potash.

As a rule, in land under cultivation for some time, complete fertilisers, containing all the three principal plant foods, will be required; but in some instances, one or the other may have to be considerably increased in order to get the best results. This can be generally ascertained by experimenting on a small scale, or a soil analysis may also give the required information. An excess of any particular plant food can be very harmful.

Formulæ of complete fertilisers for farm and orchard were published in the July, August, and September numbers of the "Queensland Agricultural Journal," which have been republished in pamphlet form, and may may be obtained from the Department of Agriculture and Stock on application.

The effect of all artificial fertilisers will be very much increased if small quantities of **stable manure** can be applied at the same time. The presence of organic matter in the form of **humus** is of the greatest importance to keep up the fertility of a soil; and in a loose well-worked soil the manures are always more effective.

When we consider the functions of the various plant-foods, it may be stated as a general rule that **potash,** which is found most abundantly in young leaves and twigs of plants, is intimately connected with the production of starch, sugar, and other carbohydrates in the leaves, and subsequent transference of these bodies to the fruits. Part of the potash is generally returned back to the soil after it has done its work in the plant.

Nitrogen promotes the growth of leaves and stems, and rather retards maturity and development of buds and flowers. The leaves show generally a deep green colour, and the whole of the plant becomes more vigorous in its growth by the application of nitrogenous manure. The amount of nitrogen in the plant itself and corresponding amounts of proteins are generally increased.

Phosphoric acid has a rather ripening effect on plants. Phosphates are generally found in the seeds, partly in association with the proteins and partly associated with fats, more particularly in Lecithin, a highly nutritious fatty compound, found in many seeds. No plant would produce seeds unless a sufficient quantity of phosphoric acid in the form of phosphates is present in the soil.

Lime aids in decomposition of organic matters, and also converts many compounds into a more available form. Its chief action, however, is to improve the physical condition of soils, particularly loosening heavy clay soils, and also, again, giving body to light sandy soils. Lime also counteracts any acidity produced by decaying vegetable matters.

ANALYSES OF FERTILISERS.

Lab. No.	Fertiliser.	Where Obtained.	Moisture.	Phosphoric Acid P_2O_5. Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Total.	Potash, K_2O.	Nitrogen, N.	Comparative Manurial Value per Ton.	Remarks.
			%	%	%	%	%	%	%	£ s. d.	
	Simple Fertilisers: Potash Manures.										
842	Sulphate of Potash (Shirley's)	R. B. Lawson, Stanthorpe ...	0·26	...	...	...	...	52·40	...	13 2 0	
2013	Ditto ditto ...	Paul and Gray, Brisbane ...	0·44	...	...	...	...	53·48	...	13 7 6	
2014	Ditto (Webster's)	Webster and Co., Brisbane ...	0·67	...	...	...	...	53·48	...	13 7 6	
	Simple Fertilisers: Nitrogenous Manures.										
846	Nitro Fertiliser (Hassell's) ...	A. E. Bateman, Stanthorpe	1·36	...	...	...	...	...	15·37	12 5 6	
2015	Sodium Nitrate ...	Webster and Co., Brisbane ...	1·50	...	...	...	...	...	15·90	12 14 0	
2016	Ammonium Sulphate (Shirley's)	Paul and Gray, Brisbane ...	0·14	...	...	...	...	...	20·86	15 2 6	
2017	Ammonium Sulphate (Webster's)	Webster and Co., Brisbane ...	1·24	...	...	...	...	...	20·86	15 2 6	
1835	Ammonium Sulphate ...	Brisbane Gas Company ...	0·17	...	...	...	...	...	20·80	15 1 6	
1931	Nitrolim ...	Campbell and Amos, Bundaberg ...	0·26	...	...	...	...	...	18·60	14 16 0	
1783	Ditto ...	N.Z. Loan and M.A. Co., Brisbane	1 53	...	...	...	...	...	18·12	14 10 0	
	Bone, Blood, Meatworks Manures, &c.										
2018	Bone Dust Q. Fertilis. Co.	T. Wood, Brisbane ...	7·25	...	...	...	23·88	...	3·89	6 7 10	
892	Ditto ...	Baxter, Maryborough ...	7·30	...	...	...	25·17	..	3 49	6 5 10	
1951	Dried Blood ...	Bergl Australia Ltd., Brisbane ...	14·36	...	...	...	...	...	12·85	9 6 4	
1952	Bone ...	Ditto ditto ...	5·98	...	...	...	23·44	...	3·53	6 1 6	
1938	Fertiliser ...	Q.M.E. and A. Co., Ross River ...	8·38	...	...	...	16·00	...	6·01	6 15 3	
1902	Dried Blood ...	Q.M.E. and A. Co., Brisbane ...	7·48	...	...	...	...	...	11·79	8 11 0	
1901	Bone Manure ...	Borthwick and Sons, Brisbane ...	8·35	...	...	...	12 85	...	6·13	6 7 7	
1879	Ditto ...	F. J. Walker, Brisbane ...	6·65	...	...	...	14·01	...	5·27	5 18 5	
1665	Fertiliser ...	Gladstone Meat Works ...	9·30	...	...	...	11·67	...	6·96	6 16 0	
1347	Dried Blood ...	Birt and Co., Brisbane ...	11·54	...	...	...	1·64	...	12 57	9 7 1	
1348	Fertiliser ...	Ditto ditto ...	4·52	...	...	...	16·85	...	5·36	6 10 3	
1238	Dried Blood ...	Torrens Creek Meat Export Co. ...	11 66	...	...	...	...	...	11·80	8 11 0	
1047	Fertiliser ...	Burdekin River Meat Preserving Co.	4·76	...	...	...	14·58	...	5·80	6 7 11	
891	Dried Blood ...	Ditto ditto ...	11·14	...	...	...	0·45	...	12·42	9 1 9	
825	Ditto ...	Borthwick and Sons, Brisbane ...	24·62	..	...	...	1·24	...	10·47	7 14 4	
845	Bone Dust (Hassell's) ...	A. E. Bateman, Stanthorpe ...	7·00	...	...	...	17·50	...	4·98	6 4 8	

ANALYSES OF FERTILISERS—*continued.*

Lab. No.	Fertiliser.	Where Obtained.	Moisture.	Phosphoric Acid P_2O_5. Water soluble.	Citrate soluble.	Citrate Insoluble.	Total.	Potash, K_2O.	Nitrogen, N.	Comparative Manurial Value per Ton.	Remarks.
			%	%	%	%	%	%	%	£ s. d.	
	Superphosphates and Basic Slag.										
1257	Superphosphate (Hassell's)	A. E. Bateman, Stanthorpe... ...	10·62	19·15	...	...	20·12	...	...	5 4 6	
2019	Ditto (Shirley's No. 1)	Paul and Gray, Brisbane	6·20	16·73	...	...	19·60	...	...	4 15 0	*Guarantee*: 17 % *Water Sol.* P_2O_5.
1886	Ditto (Shirley's No. 1)	R. B. Lawson and Co., Stanthorpe	5·40	12·11	...	..	13 27	...	...	3 8 3	*Guarantee*: 17 % *Water Sol.* P_2O_5.
2021	Basic Slag	Webster and Co.	0·24	...	16·89	...	17·10	...	...	3 8 0	Fine, 84 %.
	Mixed Fertilisers.										
843	Potato Manure (Hassell's)...	A. E. Bateman, Stanthorpe... ...	10 00	11·77	...	...	12·15	3·52	4·57	7 15 7	Nitrogen as Nitrate.
1255	Ditto (Hassell's No 1)	Ditto ditto	7 78	11·95	...	...	12·20	5·12	3·26	6 19 3	Nitrogen as Ammonia Nitrogen.
814	Cabbage Manure (Hassell's)	Ditto ditto (marked FFCL)	8·74	16·20	...	...	16·33	3·13	4 98	9 3 0	Nitrogen as Nitrate.
1258	Ditto (Hassell's)	Ditto ditto	5·62	12 97	...	...	13·23	7·48	2·44	7 4 2	Nitrogen as Ammonia Nitrogen.
303	No. 1 Sugar Cane Manure (Hassell's)	Redmond Bros., Bundaberg ...	1·58	2·97	...	...	5·61	7 04	8·32	9 2 10	" " "
297	Maize Manure (Hassell's) ...	Ditto ditto	9·14	16·01	...	...	16·60	5·44	2·46	7 11 5	
309	Banana Manure (Hassell's)	Ditto ditto	2·98	3·85	...	...	5·24	27·92	1 99	10 9 11	Nitrogen as Nitrate.
306	Easterby's Cane Mixture (Hassell's)	Ditto ditto	2·50	5·56	...	...	7·96	6·76	8·04	9 10 2	
307	A1 Sugar Cane Mixture (Hassell's)	Ditto ditto	3·60	4·08	...	...	4·25	10·41	11·65	12 8 1	
308	Guano (Hassell's)	Ditto ditto	19 98	...	...	...	8·47	1·74	3·75	4 9 5	
294	Pineapple and Strawberry Manure (Hassell's)	Ditto ditto	7·30	5·49	...	...	7·41	9·95	5·27	8 13 8	Nitrogen as Nitrate.
2022	Shirley's No. 0	Paul and Gray, Brisbane	1·71	...	14·25	...	16·86	6·59	2·41	6 8 4	Nitrogen as Ammonia Nitrogen.
1251	Ditto No. 2	R. B. Lawson, Stanthorpe	4·98	16·40	...	...	18·15	1·34	1·87	6 7 7	" " "
2023	Ditto No 2	Ditto ditto	1·50	14·69	...	...	15·50	1 03	1·65	5 9 11	" " "
1252	Ditto No. 3	Ditto ditto	7 30	12·75	...	...	12·95	2 39	3·18	6 7 0	" " "
2024	Ditto No. 3	Paul and Gray, Brisbane	6·13	12·46	...	...	12·93	2·11	2·94	6 1 6	" " "
1253	Ditto No. 5	R. B. Lawson, Stanthorpe	6·78	12·22	...	...	12·42	6·12	2·42	6 14 9	" " "
1899	Ditto No. 5	Ditto ditto	3·60	10·82	...	...	11·42	6·97	3·26	7 4 9	*Guarantee*: 12 % P_2O_5 — 7 % K_2O — 3·3 % N.
2026	Ditto No. 5	Paul and Gray, Brisbane	4·85	12 60	...	...	13·78	7·33	2·93	7 3 9	Nitrogen as Ammonia Nitrogen.
2027	Ditto No. 7	Ditto ditto	5 70	11·27	...	...	12·04	3·75	1·62	5 6 6	" " "
2028	Ditto No. 9	Ditto ditto	1·22	5 66	...	...	6·09	4·19	3·87	5 10 8	" " "
1254	Ditto No. 11	R. B. Lawson, Stanthorpe	6·10	10·62	..	...	10·78	6·05	Nil	4 9 6	*Guarantee*: 7 % *Potash.*
2029	Ditto No. 14	Paul and Gray, Brisbane	1·13	5·16	...	...	16 76	6·14	2·36	7 1 7	
2030	Ditto No. 19	Ditto ditto	1·12	3·65	...	...	11·96	1·89	3·92	5 19 7	Nitrogen as Ammonia Nitrogen.
2031	Ditto L. S. D. Cane Fertiliser	Ditto ditto	0·97	5·44	...	...	5·49	8·76	7·63	9 7 6	" " "

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order GERANIACEÆ.

ERODIUM, L'Herit.

E. Botrys, *Bertol* (Plate 82.) A glandular pubescent annual. Stems from ½ to nearly 2 ft., robust. Leaves oval-oblong, the radical ones long-stalked pinnatifid with coarsely-toothed lobes, the upper ones with deeply-toothed lobes. Peduncles usually longer than the leaves, bearing an umbel of 1-4 flowers. Pedicles 1-3 times longer than the calyx, bracteoles small ovate-acute. Sepals mucronate. Petals of a lilac-purple, oblong, equal, longer than the calyx. Beak 2½-4 in. long.

Hab.: A native of the Mediterranean region; naturalised at Bungeworgorai, Roma, *R. E. Soutter.*

Order EUPHORBIACEÆ.

PHYLLANTHUS, Linn.

P. Niruri, *Linn.* An annual herbaceous weed about 2 ft. high, the stem often branching at the base, angular, glabrous; the leaf-bearing branchlets slender, spreading. Leaves numerous, crowded, distichous, somewhat imbricated, spreading, nearly sessile, ½-¾ in. long, oblong-ovate, obtuse, thin, pale beneath; stipules very acute. Male flowers very minute, often 2 or 3 together, sepals rounded, stamens 3. Female flowers much larger, solitary; sepals oval, subacute, with broad white margins. Fruit very small, about 1 line, depressed-globular, faintly 3-lobed, quite smooth. Seeds with slender ribs.

Hab.: Growing as a weed sparingly in the Botanic Gardens, Brisbane, *J. F. Bailey.*

ADRIANA, Gaudich.

A. quadripartita, *Gaudich.* in Freyc. Voy. Bot. 489; (Benth. Fl. Austr. VI., p. 135). A shrub of 2-6 ft., quite glabrous in all the specimens seen. Leaves all opposite, sessile or very shortly petiolate, ovate, ovate-lanceolate, or oblong, acute or obtuse, coarsely toothed, 3-nerved at the base, mostly 1½-2 in., rarely 3 in. long. Spikes short and few flowered, styles united at the base. Capsule glabrous, minutely stellate-hairy or almost muricate.

Hab.: Toowoomba, *J. J. Carew.*

Order GRAMINEÆ.

SETARIA, Beauv.

S. glauca, *Beauv.* **var. minutissima,** *Bail.* n. var. (Plate 83.) The present plant differs from *var minor* principally in its smaller and weaker growth; the inflorescence generally smaller and sometimes very small; spikelets also much smaller and the awn-like barren branchlets more numerous and very spreading.

Hab.: Nelson, *A. A. Girault* (May, 1912).

PLATE 82.—ERODIUM BOTRYS, *Bertol.*
A. Carpel with its awn.

PLATE 83.—SETARIA GLAUCA, *Beauv.* VAR. MINUTISSIMA, *Bail.*

STENOTAPHRUM, Trin.

S. subulatum, *Trin.* (Plate 84). Habit of *S. americanum* (common Buffalo Grass). The flowering stems arising in an upward direction not truly erect (assurgent), the nodes rather close. Upper sheaths 1 to nearly 2 in. long; blades linear, acute, 1-3 in. long, 3-4½ lines broad, sometimes densely hairy. Rhachis of inflorescence 1-4 in. long, oblong in section, 1½ lines diameter; upper spikes 1-2 flowered, lower 3-4 flowered, almost hidden in the hollows of the unjointed rhachis; spikelets 1 line long, glabrous, oblong-lanceolate, acute.

Hab.: Masthead Island, *Aus. Ornith. Union* (Oct., 1910); *H. A. Longman* (Sept., 1912).

Order HEPATICÆ.

Frullania Simmondsii, *Steph.*

Hab.: Near Brisbane, *J. H. Simmonds.*

Order FUNGI.

PYRENOMYCETEÆ.

The following additions to our Fungi have been determined by Miss E. M. Wakefield, Royal Botanic Gardens, Kew, England.

Poronia punctata, *Linn.*

Hab.: On dung, Brisbane, *C. T. White.*

HYPHOMYCETEÆ.

Cercospora neriella, *Sacc.*

Hab.: On leaves of Oleander (*Nerium oleader*), Brisbane, *C. T. White.*

Cercospora myrticola, *Speg.*

Hab.: On leaves of *Tristania suavcolens*, Brisbane, *C. T. White.*

Isaria suffruticosa, *Cke. et Mass* (Plate 85).

Hab.: On the larva of a beetle in the soil, Brisbane, *F. Hughes.*

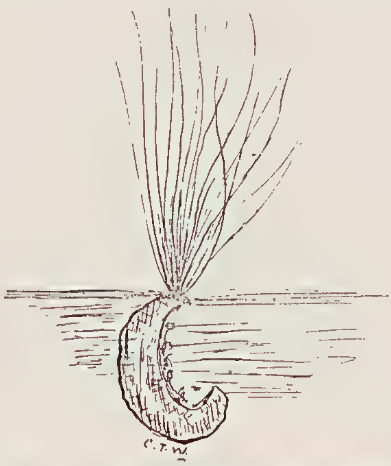


PLATE 85.—ISARIA SUFFRUTICOSA, *Cke. et Mass.*

Epicoccum neglectum, *Desm.*

Hab.: On leaves of mulberry (*Morus alba*), Sandgate, near Brisbane, *C. T. White.*

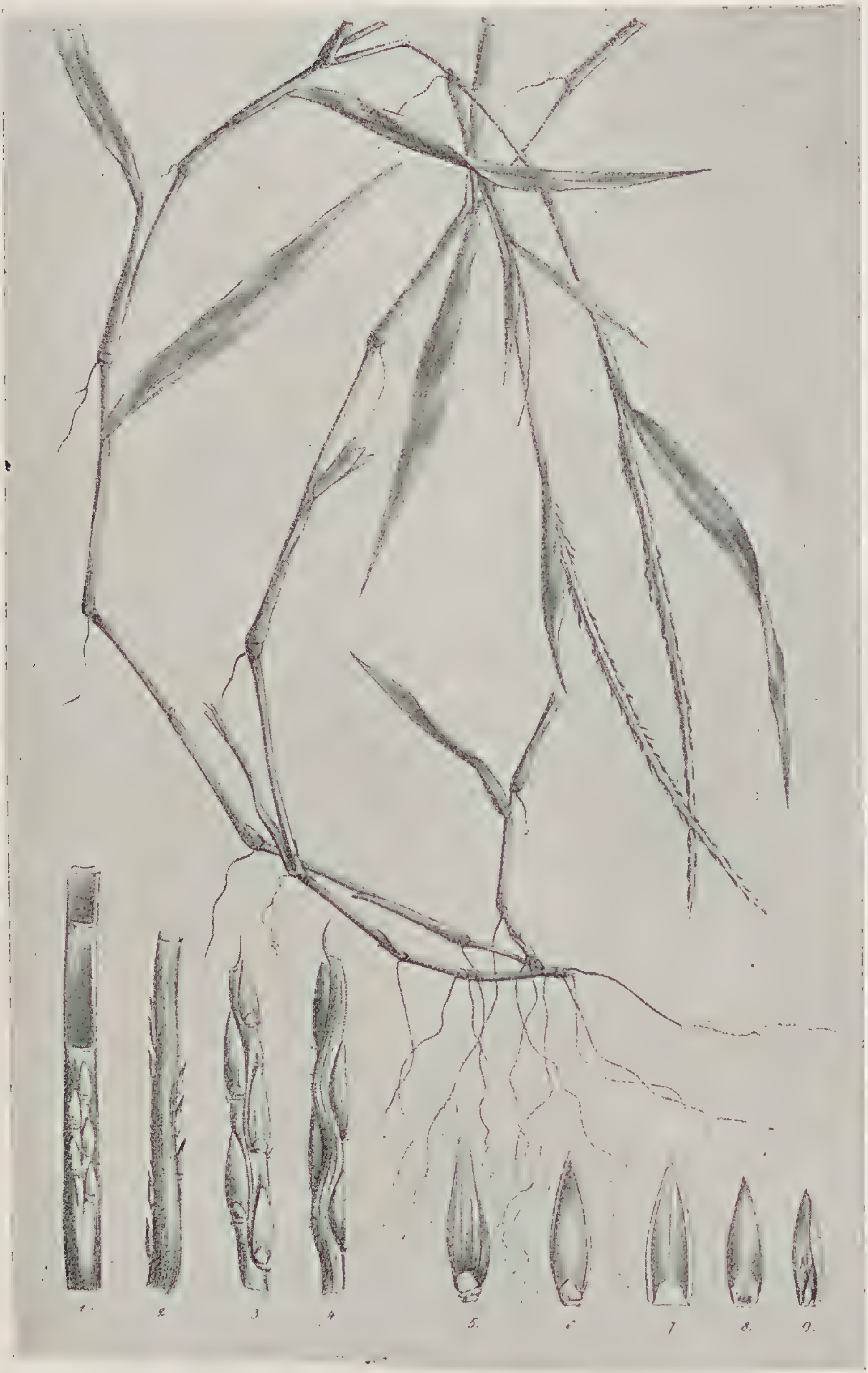


PLATE 84.—STENOTAPHRUM SUBULATUM, *Trin.* (Plant reduced.) (1)-(2), portion of rhachis; (3)-(4), lower spikes; (5)-(6), spikelets; (7), neuter floret; (8), flowering glume with lodicule and ovary; (1)-(8), enlarged. The above Plate is somewhat reduced from the figure in the "Species Graminum" (Trinius).

BRISBANE BOTANIC GARDEN NOTES.

By J. F. BAILEY, Director.

Martinezia caryotiaefolia is a small-growing palm, its slender stem, and in fact most parts of the plant, being beset with numerous spines. The segments of the leaves are wedge-shaped and uneven at the end,

Plate 86.—Martinezia caryotiæfolia.

somewhat like those of a *Caryota*. Our plant fruits regularly, from which young plants have been raised.

PLATE 87.—LIVISTONA CHINENSIS.

Livistonia chinensis is an elegant species belonging to China and Japan, and is one of the most graceful of the fan palms, the margins of the large circular leaves being cut into numerous drooping segments. It is an excellent subject for lawn ornamentation.

Fans are made of the leaves and rope of the fibrous sheaths of the leaf-stalks. It seeds freely with us, and, being a popular palm for pot culture, is extensively propagated by our nurserymen, some of whom catalogue it as *Latania borbonica.*

PLATE 88.—RHAPIS FLABELLIFORMIS.

Rhapis flabelliformis is the Ground Rattan or Walking-Stick Palm of South China. It is of stoloniferous habit, and forms large clumps. and is useful for forming hedges, requiring little attention to keep in order. Our plants have not so far borne seed, but propagation is easy from the many suckers which spring up about the clumps.

The stems furnish very useful walking-sticks, and form an article of commerce in the native country of the plant.

Pritchardia Gaudichaudi is a Hawaiian fan palm of great beauty. It is represented here by one fairly old plant and several young ones, all of which are attractive. Its native name is "Loulu." The kernel of the fruit is eaten before ripening, and the leaves, as is the case with most fan palms, are made into fans and hats.

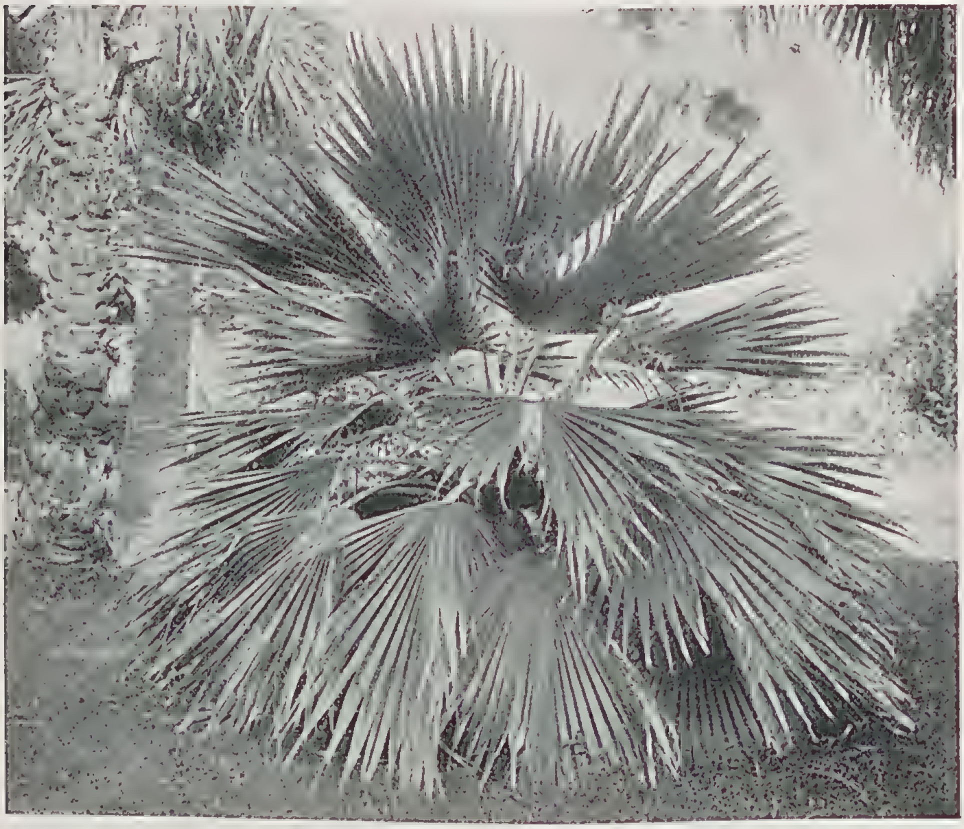


PLATE 89.—PRITCHARDIA GAUDICHAUDI.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1913.	May, 1912.
North Coast.	In.		In.	In.
Atherton	1·86	11	3·37	3·43
Cairns	4·40	25	7·52	5·97
Cardwell	3·51	25	8·96	3·60
Cooktown	2·83	25	5·72	2·45
Herberton	1·49	25	3·63	2·20
Ingham	3·47	20	5·33	1·60
Innisfail	12·12	25	12·84	41·84
Mossman	...	...	4·27	2·78
Townsville	1·46	23	2·26	0·63
Central Coast.				
Ayr	1·21	25	2·02	1·01
Bowen	1·41	25	1·71	1·76
Mackay	4·20	25	4·65	3·42
Proserpine	6·68	8	6·54	5·81
St. Lawrence ...	1·95	25	2·43	1·98
South Coast.				
Crohamhurst ...	6·00	...	8·13	...
Biggenden	2·09	14	4·06	0·41
Bundaberg	2·90	25	5·31	1·33
Brisbane	2·97	62	6·32	0·20
Childers	2·50	17	5·89	0·98
Esk	2·30	25	4·05	0·11
Gayndah	1·71	25	3·49	0·69
Gympie	2·87	25	4·09	0·52
Glasshouse Mount's	...	...	...	...
Kilkivan	2·16	25	6·41	0·45
Maryborough ...	3·00	25	7·21	1·09
South Coast—continued:	In.		In.	In.
Nanango	1·68	25	3·76	0·16
Rockhampton ...	1·62	25	3·45	1·98
Woodford	2·99	25	6·86	0·43
Yandina	4·91	19	7·19	1·39
Darling Downs.				
Dalby	1·53	22	2·47	Nil
Emu Vale	1·12	17	2·05	0·11
Jimbour	1·41	24	2·22	0·14
Miles	1·81	25	2·61	0·40
Stanthorpe ...	1·78	22	3·31	0·30
Toowoomba ...	2·24	22	5·92	0·16
Warwick	1·57	22	4·16	0·09
Maranoa.				
Roma	1·43	21	3·19	Nil
State Farms, &c.				
Gatton College ...	1·96	14	3·49	...
Gindie	1·11	13	3·69	0·11
Kamerunga Nurs'y	4·37	23	8·48	...
Kairi	...	...	2·18	...
Sugar Experiment Station, Mackay	...	...	...	...
Bungeworgorai ...	...	...	3·69	...
Warren	...	...	2·76	1·28
Hermitage ...	...	...	2·96	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

General Notes.

THE USE OF CABLEWAYS EXTENDING.

In our January issue (writes the editor of "Tropical Life") we published an article showing how the use of cableways was tending to increase on all sides, and urging a further extension of this useful and comparatively inexpensive method of transport. Since doing so we have received the weekly edition of the "Times of Ceylon," of 6th February, which we were pleased to see contained three long and influentially written articles urging the authorities to construct lines, the main reasons for doing so being to reduce the labour of hand transport, as a general labour-saving conveyance, and to relieve the island's transport system, which seems to need being augmented to avoid the serious congestion that arises through insufficient road and rail conveyances.

We have so often claimed the well-known advantages of aerial ropeways that we rather demur at repeating them; still, we will state what others say, as they fully confirm what we have written on the subject. They state that this method of transport should be adopted on account of—

(1) Small initial cost compared with roads and bridges.
(2) Extreme simplicity in working.
(3) Ability to transport material in a direct line over precipitous ground, rivers, defiles, &c.
(4) Small consumption of power as compared with the tonnage transportable.
(5) Low cost of upkeep and depreciation.
(6) Great capacity for transport, as much as 40 tons each way per day of ten hours being handled on the type of line erected in Ceylon, and much more being possible if required.
(7) Small demand for labour for loading and receiving.

There are two distinct types of cableways—viz., the fixed-rope system, and the moving one. The latter is the one employed throughout Ceylon, and is thoroughly suitable for the light loads usually handled here, and for almost all gradients met with.

An aerial ropeway of this type is, as a rule, constructed to carry loads of an average of 150 lb. each at intervals of one per minute, and at a speed of 3½ to 4 miles per hour, but the frequency and weight of the loads can be largely increased. Such cableways will also meet the most ordinary requirements in Ceylon, such as breadth of span, steepness of gradient, though with gradients of over 1 in 2·5 special carriers may become necessary. As regards cost, the most economical type of line is one 3 to 4 miles in length over a regular succession of hills and valleys, and in proportion to the abundance of rivers, and bad

ground that a cart road (or railway) would have to cross, the cableway becomes the more economical since it requires no bridges, no filling in, and no drainage or other costly work before the road proper can be prepared. Even where easy gradients and lack of obstacles make the cost of roads fairly cheap, the initial cost of the ropeway is unlikely to exceed that of the road; but even were it to do so, a distinct and permanent profit would be made on account of the labour-saving, and hence cheaper means of transport which would be provided for those having goods to send to and fro.

Coming now to the question of upkeep, the "Times of Ceylon" correspondent goes fully into this also. Apart from the cost of loading and unloading, there should only be an occasional visit from a mechanic to shorten the cable, repair splices, &c., plus a small annual sum for renewal of hangers, wheels, and bearings, and for paint, oil, grease, &c. Such upkeep will vary on different estates, or "ways," according to the tonnage passed over them, the care bestowed in using them, and on their upkeep whilst in use.

Coming to cable renewals, capital redemption, &c., sufficient money must be put by to meet these. It is sound practice to write off a sufficient sum to cover the cost of the entire way in twenty years. The cable, under exceptional wear or unfavourable conditions, may require to be renewed after the third year, but under ordinary circumstances it should last for six years. Great care and most favourable conditions could see a cable last for ten years, but to do so it is doubtful if it would be working at full pressure all the time. The Ceylon authority estimates the cost of cable renewal at about Rs. 2,700 to Rs. 3,000 (£180 to £200) per mile between terminals, erected and running.

The labour required to work the line is bound to vary on account of the gradients, the length of the line, the number of angles, &c.; on an ordinary straight line driven from a factory shaft the following staff is required (in Ceylon):—

(1) For each intermediate loading station from which loading is in progress, two coolies.

(2) For each terminal, two coolies, but possibly more if traffic is heavy.

(3) For patrolling the line, one coolie.

As, however, such a line will transport 40 tons a day each way, even if above numbers have to be increased, the saving in wages and cost of transport generally must be substantial when one thinks of the number of coolies it would take to transport 80 tons of stuff by other means. Both in upkeep and cost of transport, therefore, cableways seem able to show a great advantage over cart roads, and added to this there is the saving in the value of the land that cart roads or railways occupy, plus the cost and upkeep of the cattle, the carts, and their drivers.

"From the very commencement of my term of office," reported Sir Henry McCallum, then Governor of Ceylon, in his "Review of the

Administration of Ceylon for the Years 1907-13," "I have been impressed by the difficulties of road transport in Ceylon. These difficulties, which are of course greatly accentuated in the hill districts, have for the past few years been immeasurably increased by the unfortunate recrudescence of rinderpest in epidemic form. Transport by bullock cart is at the best a slow and unsatisfactory process, but when there is added the wholesale death or slaughter of draft cattle and the restriction of traffic between one district and another, the situation becomes one of considerable gravity." To show that the matter is still a burning one we need only add that as recently as 8th March last a joint deputation of the Planters' Association of Ceylon and the Chamber of Commerce waited on His Excellency the Acting Governor at Queen's House, by appointment, to represent to His Excellency the difficulties of road transport at present experienced in Ceylon, which have formed the subject of some luminous speeches at the recent annual meeting of the Planters' Association of Ceylon.

[We specially recommend a careful study of aerial ropeways to those interested in planting operations above the coast ranges of Papua, to reach which the traveller has to laboriously climb steep, rugged ranges over which ordinary roads have not been constructed, nor is it possible to do so. Along the narrow native tracks, which invariably lead straight up the mountains, all stores, implements, and furniture have to be carried by the natives either on their backs, or slung on a pole between from two to ten men. We once saw a piano being thus carried up to the Government Nursery at Hombrom Bluff.—Editor *Q.A.J.*]

COMBATING GRASSHOPPERS IN SOUTH AFRICA.

The English in South Africa, the neighbouring German colonies of the South-East, and the Portuguese of East Africa have, for some years, united in the creation of a "Locust Bureau," charged with the duty of studying the life-history and conditions of life of locusts, and of co-ordinating measures of defence against them.

Thanks to this organisation, the flights of locusts are signalled from all points of the adjacent territories, and their invasions are frustrated from the commencement, as in Algeria.

The "Bulletin Economique de Madagascar" furnishes some interesting details as to the operations of the "Locust Bureau":—

Amongst the various methods of combating the locusts, the latest is that of an arsenical preparation which consists in spraying the hoppers, either when they are hatched or when they are already on the march, with a solution of arsenate of copper in water. To this solution is added a quantity, more or less, of molasses and sugar. These preparations have been supplied to all the districts of administration. The prepared insecticides have been placed on the market, and distributed either gratuitously or sold at very reduced prices, owing to the Government subsidy. The operations against the invasion were carried out by special officials entitled "locust officers," to whom had been temporarily assigned a detachment of soldiers.

The insecticide instantly kills all the insects it touches, but even those which have not been reached directly die by devouring either the infected grass or the bodies of poisoned hoppers.

The insecticide used in Africa is prepared under Government supervision and supplied in special iron drums, containing 26·814 lb., branded "Locust Poison." Each drum contains 5 lb. arsenate of soda (69 per cent.), 1 gallon of molasses, and 10 lb. of brown sugar.

To prepare this poison, 200 lb. of arsenate of soda are dissolved in 15 gallons of boiling water, which is made up to 20 gallons with cold water.

Into each drum half a gallon of this solution is poured, to which is added 1 gallon of molasses and the whole thoroughly stirred. This constitutes the "Prepared Locust Poison."

In a circular (1st September, 1909), the Department of Agriculture of the Transvaal recommends the following:—

(*a*) For insects under two weeks old—

"Prepared Locust Poison"	1 part.
Water	60 parts.

(*b*) For older insects—

"Prepared Locust Poison"	1 part.
Water	50 parts.

Four workmen can prepare 200 drums per day. The cost of one drum is 1s. 2½d.

The price of the ingredients works out thus—

	s.	*d.*
Drum	1	0½
Molasses	0	7
Arsenate of soda	1	0½
Labour	0	1
Sundries	0	2
	2	11

The solution is sprayed as lightly as possible on the vegetation surrounding a sleeping swarm or over a portion of land several yards square in advance of a swarm on the march; thorough wetting of the grass or insects is to be avoided. The hoppers are attracted by the sweetened liquid, and are generally destroyed in a few hours. The experiments made by the Locust Bureau have shown that, by taking some precautions, there cannot be any danger to cattle in the infected zones by the use of the insecticide. Some precautions are also needed to prevent the irritation of the skin caused by the manipulation of the insecticide. This has been obviated by the preparations being supplied in hermetically sealed cases, already prepared, and which may be at once emptied into the water, and also by the use of implements similar to the pumps used for sulphuring grape vines.—"Bulletin de l'Office du Gouvernement Géneral de l'Algerie."

ANNUAL PRODUCTION OF THE WORLD'S MOST IMPORTANT FISHERIES.

The importance of fish as an article of diet for the human race is universally recognised. Their delicate, palatable, and easily digested flesh is, in many cases the sole food of many races of men. Entire nations, such as the Eskimaux, Greenlanders, Tschuktshes, &c., are almost entirely dependent upon fish for their nourishment. A glance at our pictorial statistics will show what value fish possess as an article of a nation's food. The illustration shows by comparative size the total value of salt and fresh water fish consumed in each country. Whilst fish play a conspicuous and important part in the food supplies of other countries, it is only in Germany, where the high price of meat is almost prohibitive, as well as in Austria-Hungary, whose waters contain immense stores of fish, that there are large areas where the people are not yet satisfactorily instructed in the food value of cheap fish.

	Marks.	£
Japan	315,000,000	15,750,000
United States of North America	282,000,000	14,100,000
England	234,000,000	11,700,000
Russia	126,000,000	6,300,000
France	118,000,000	5,900,000
Norway	36,500,000	1,825,000
Spain	31,900,000	1,595,000
Holland	17,142,000	885,000
Germany	12,200,000	610,000
Austria-Hungary	5,800,000	290,000

ARROWROOT INDUSTRY IN JAMAICA.

From a paper read before the Land's River Branch of the Jamaica Agricultural Society, and published in the society's "Journal" for March, 1913, on the subject of arrowroot-growing, we take the following items showing the value of the product per acre in Jamaica:—

The following figures may be helpful in showing what may be raised if the arrowroot industry were taken up and carried on systematically:—

One hundredweight of tubers will give, say, 20 lb. of starch, which works out to about 15 cwt. to 300 lb. starch, and this is the return from one square chain of land.

The starch is sold at varying prices according to the crop and the demand. This year the price was high, 25s. per 100 lb. This means £3 15s. per square chain, or £37 10s. per acre. Even at much less the industry may be made profitable. Of course, as may be seen, there is a great great amount of hand labour involved in the preparation of the starch.

The market is ruled by the price of St. Vincent arrowroot, which is quoted now at 3¾d. to 4d. per lb.

With a small central factory, the work might be done to greater advantage with less hand labour.

SELECTION OF SEED COCOANUT NUTS.

It is of paramount importance, says a writer in the "Tropical Agriculturist," that the greatest care be taken that only the best nuts be got for seed. Time, trouble, and expense should not be grudged, for a great deal of the future of the plantation depends on the trees from which the seeds nuts have been chosen. It is well to choose nuts from trees ranging from 20 to 50 years of age—that is, those in their very prime. The tree should present a vigorous growth and have large crowns carrying the bunches of fruit on well-set short stems. It is well to avoid those trees that show a tendency to drop their nuts, however large or numerous, and those with scanty or drooping fronds. There is a prejudice in favour of a large-sized nut, but medium-sized nuts are to be preferred since one has to take a commercial view of the product. Where the nuts are exceptionally large, it follows that there would be fewer on a bunch than where the nuts are of medium size. The difference in numbers when acres are considered will be very considerable, as nuts are sold by the thousand, only very small ones being rejected. In weight, too, if you turn your nuts into copra, there is a great advantage, considering their numbers, in medium over large nuts. It is best to choose, therefore, medium-sized nuts, globular in shape, and with a thin husk and a thick kernel for the nursery.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1913.

Article.		MAY. Prices.
Bacon, Pineapple	lb.	8d. to 9d.
Bran	ton	£4 10s.
Butter	cwt.	98s.
Chaff, Mixed	ton	£4 to £5 10s.
Chaff, Oaten (Victorian)	„	£4 to £5 10s.
Chaff, Lucerne	„	£4 to £6
Chaff, Wheaten	„	£4
Cheese	lb.	4d. to 4½d.
Citrons	cwt.	12s.
Flour	ton	£9
Hay, Oaten (Victorian)	„	£5 to £6 10s.
Hay, Lucerne	„	£3 to £5
Honey	lb.	2½d. to 3d.
Maize	bush.	3s. 5d. to 3s. 6d.
Oats	„	4s. to 4s. 3d.
Pollard	ton	£5 5s.
Potatoes	„	£5 to £9
Potatoes, Sweet	cwt.	2s. 6d. to 3s. 6d.
Pumpkins	ton	£2 10s. to £2 15s.
Rosellas	sug. bag	1s. 6d. to 2s. 6d.
Wheat, Milling	bush.	3s. 6d. to 3s. 8d.
Tomatoes	case	2s. to 4s. 4d.
Onions	ton	£9
Hams	lb.	1s.
Eggs	doz.	1s. 4d. to 1s. 8d.
Fowls	pair	2s. 3d. to 3s. 6d.
Geese	„	6s. to 6s. 6d.
Ducks, English	„	2s. 6d. to 3s.
Ducks, Muscovy	„	2s. 3d. to 4s.
Turkeys (Hens)	„	6s. to 7s.
Turkeys (Gobblers)	„	10s. to 15s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	17s. to 18s. 6d.
Bananas (Fiji), G.M., per bunch	5s. 6d. to 9s. 6d.
Mandarins (Queensland), per case	9s. to 11s.
Oranges (Maryborough), per case	7s. to 8s.
Passion Fruit, per half-case	2s. 6d. to 3s. 6d.
Persimmons, per half case	3s. 6d. to 7s.
Pineapples (Queensland), Queens, per case	10s. to 11s.
Pineapples (Queensland), Ripleys, per case	9s. to 10s.
Pineapples (Queensland), common, per case	9s. to 10s.
Tomatoes, per half-case	2s. to 4s.
Cucumbers, per bushel case	3s. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE. Prices.
Apples (Eating), per case	6s. 6d. to 7s. 6d.
Apples (Cooking), per case	6s. to 7s.
Apples (American) per case	...
Bananas (Cavendish), per dozen	3d. to 4½d.
Bananas (Sugar), per dozen	2d. to 3d.
Coconuts, per sack	12s. 6d.
Custard Apples, per case	4s. to 5s. 6d.
Grapes, per lb.	...
Lemons (Local), per case	5s. to 6s. 6d.
Lemons (Italian), per case	...
Limes, per case	4s. 6d. to 5s. 6d.
Mandarins, per case	4s. to 6s. 6d.
Mangoes, per case	...
Nectarines, per case	...
Oranges, per case	3s. to 4s. 6d.
Oranges (Navel), per case	...
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per quarter-case	...
Peanuts, per lb.	2d. to 3½d.
Persimmons, per case	...
Pineapples (Ripley), per dozen	1s. 6d. to 2s. 6d.
Pineapples (Smooth), per dozen	2s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 2s.
Plums, per case	...
Rockmelons, per doz.	...
Strawberries, per dozen pints	6s. to 12s. 6d.
Tomatoes, per quarter-case	4s. to 5s. 6d.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, MAY, 1913.

Animal.	MAY. Prices.
Bullocks	£8 10s. to £9 17s. 6d.
Bullocks (Single)	£10 5s.
Cows	£6 15s. to £7 12s. 6d.
Merino Wethers	20s. 9d.
Crossbred Wethers	27s.
Merino Ewes	17s.
Crossbred Ewes	19s. 3d.
Lambs	17s. 3d.
Pigs (Porkers)	35s.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent plantings of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp.* Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been

* A pamphlet on the cultivation of cane upon old lands, by Mr. H. T. Easterby, General Superintendent of Sugar Experiment Stations, was issued last month (May, 1913) by the Department of Agriculture and Stock, and may be obtained on application to the Under Secretary.

raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure, has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they

may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or less extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is

often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their Winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. AUGUST, 1913. PART 2.

Agriculture.

RHODES GRASS AND VEGETABLES AT MITCHELL.

It used to be said, in the good old days, that the Darling Downs would never produce a cabbage. In like manner, even in these enlightened times, many people in the Maranoa district assert that the English potato cannot be produced to perfection between Roma and Mitchell. This fallacy was practically confuted at the beginning of July last, when Mr. F. Krause, who is farming near Mitchell, brought to this office as fine a sample of Early Rose and Brownells as one could wish to see, which were grown by his neighbour, Mr. A. Welby, on a blacksoil flat. In the illustration they are a little less than natural size. Mr. Welby also had a crop of Swedes, many weighing up to 20 lb. each. Wheat succeeded admirably, as it generally does in the district, the straw running to over 4 feet in height. Another farmer, Mr. G. Lansdown, has an area of red, sandy loam laid down with Rhodes Grass, and, although it has experienced eight consecutive frosts, the excessive cold has had no effect on the grass, which appears to be admirably adapted to the district.

In November, 1912, Mr. G. B. Brooks, Instructor in Agriculture, wrote as follows about the grass and its supposed susceptibility to cold:—" When Rhodes Grass was first introduced, it was looked upon as being entirely useless as a winter grass, owing to its susceptibility to low temperatures, and this conception was undoubtedly the chief cause

of keeping it from coming into more rapid use. Having now been under observation for a number of years, and subjected to varying conditions of soil and climate, it has been found to readily adapt itself to its

PLATE 90.—EARLY ROSE AND BROWNELL'S BEAUTY (NATURAL SIZE). GROWN BY MR. A. WELBY, NEAR MITCHELL.

surroundings. It grows in moist, warm, low-lying coastal situations; it will, when a sudden drop to freezing point occurs, get cut down to some extent, but, on the other hand, when raised under more hardy climatic conditions, such as our Western scrubs, it will often withstand low temperatures without being in any way seriously affected. During the past winter I saw large areas on the Downs looking quite fresh and green after having experienced both a long spell of dry weather and a succession of fairly heavy frosts, while adjacent Paspalum paddocks were quite brown and dry."

Mr. T. C. Black, of Brigalow, 191 miles west, has 300 acres under this grass, and in 1911 he made upwards of £500 off 45 acres.

Thus Mr. Brookes and Mr. Black fully bear out Mr. Lansdown's experience. The latter also has grown, on the same soil, cauliflowers 16 lb. in weight and Succession cabbages 20 in. across and perfectly solid. Broom millet was grown by Mr. Krause, the hurl of which was 2 ft. long, and imphee on sandy loam attained a height of 10 ft.

PLANT PESTS.

(*OXALIS CORYMBOSA.*)

In our June issue we discussed those pestiferous weeds—nut grass, water hyacinth, and lantana. Another nuisance, particularly in gardens, is the *Oxalis corymbosa,* which originally was a native of Brazil, the plants of which country thrive well in Queensland. This particular plant has spread, and continues to spread with great rapidity. It is, fortunately, not very difficult to eradicate in town gardens, and must not be confounded with *Oxalis cernua,* the variety which has spread so disastrously in South Australia, and known there as " Sour-sops." This is a native of Africa, and, therefore, was to be expected to find itself at home under the dry summer conditions of the Southern State.

Mr. Leslie Corrie, in his paper on " Some Pests " read at a session of the Agricultural Conference at Warwick, in June, 1900, said:—" If *Oxalis corymbosa* had not already taken such a hold in and about Brisbane, and was not spreading so alarmingly as to cause gardeners and others who have to deal with it to wonder whether to give it or nut grass the priority as a pest, this plant would not have been selected for an example which should receive the strictest attention in order to prevent the infection of any fresh districts. The case is this: That what has happened and is extending in South Australia, in connection with *Oxalis cernua,* is extremely likely to happen in Queensland with *O. corymbosa.* The efforts tried to destroy the variety troubling the South Australians meet with just the same results when applied to the kind now so common in Brisbane. Unless salt, gas lime, or other poisons are applied in quantities sufficient to also destroy the soil, the plant cannot be killed. While pigs, fowls, &c., will greedily eat the roots, they will not devour every particle. Constant cutting down, as in the case of nut grass, is valueless, and no cultivation of the soil does anything else but help the propagation of the pest. In fact, in many ways,

Oxalis and nut grass run neck and neck and they supplement one another, inasmuch as, while the latter is essentially a summer weed, the former is most pronounced during the colder months.

Oxalis can be killed like nut grass, if loads of fresh manure are dumped down and allowed to ferment over it for a sufficiently long period, which treatment might be applied to a solitary patch in a new district.

Since the publication of our first article on "Plant Pests" in the June issue of the journal, we have received a letter from Mr. Maiden, Director of the Botanic Gardens, Sydney, and Government Botanist of New South Wales, taking exception to the statement that "the water hyacinth seems to have first appeared in the Sydney Botanic Gardens." That statement was made by an authority for these notes on "Plant Pests," Mr. Leslie G. Corrie, in a paper read at the Agricultural Conference at Warwick (4th to 7th June, 1900) on "Plant Pests." In 1906 an official report on the water hyacinth was made by Messrs. Guthrie, Burrows, and Maiden, which was laid on the table of the New South Wales Legislative Assembly in 1906, and reprinted in the New South Wales "Agricultural Gazette" for December, 1906, in which it was stated that the first water hyacinth on the Northern Rivers of New South Wales was purchased from a nurseryman in Brisbane as a pretty plant, and was thrown into Swan Creek, South Grafton, by a local resident when he tired of it. Mr. Maiden generously avoided any reference to the Queensland public official (?) who first introduced the water hyacinth, but we think that the *fons et origo* of the introduction of the pest to New South Wales may rightly be laid at the door of the South Grafton resident who threw it into Swan Creek, notwithstanding his having obtained it in Queensland. The late Mr. Philip Mac Mahon, Director of the Brisbane Botanic Gardens in 1898, had the water hyacinth growing in a pond at the Gardens; and in a series of articles in the journal he mentions, in January, 1898, "our *friend* the water hyacinth," even then growing on the land. We pointed out to him the danger likely to arise from the fostering of this plant, and he eventually got rid of it.

GRASSHOPPERS.

[CONTINUED FROM JUNE.]

BY R. JARROTT, Manager, Gindie State Farm.

Previously we used a knapsack spray, but found that it disturbed the hoppers too much, as it was necessary to get very close to them. Latterly we used a spray obtained from Carl Zoeller; it has a very powerful pump, and the tub which accompanies it, holds about 50 gallons. We obtained 20 ft. of rubber hose, as that sent with the outfit is much too short for the purpose. The extra length of hose enables the tub the hose to be inside the "brake" and drive the hoppers before him and pump to be placed outside the calico, but permits the one using while spraying them. If the insects are large, they require to be thoroughly wetted to make sure of their being killed. This spray will do this thoroughly and quickly, if the man at the pump chooses to put

on steam enough to sweep the hoppers before it on clean ground. I have no hesitation in saying that, if we had not taken the measures we did, we should have lost a very nice crop of 6 acres of maize that is now safely stowed away in the silo. After we thought we were secure from the pest, we received a shock one morning by seeing a cloud of hoppers on the wing coming straight into the maize crop. Fortunately, we had taken the precaution to leave a considerable amount of rubbish, harrowings, &c., all along one side of the maize paddock. This was quickly fired and green weeds thrown on to it, which made such a thick smoke that it dislodged those that had settled and turned those that were flying.

Unfortunately, the large landowners, as a rule, do not trouble much, if at all, about this plague. If they have a paddock or two eaten out, it does not matter much, as they can shift their stock, but it is quite a different matter with the small man. If he has the grass destroyed in one paddock, he stands a good chance of being in difficulties unless good rain falls immediately after the grass has been destroyed. It is very little use for one or two in a district to endeavour to combat this trouble. Every landowner must take a hand. I think this is a much more serious matter than many people imagine. Other countries have had to legislate and make it compulsory for all landowners to do their share in hopper destruction, and I think it would not be too soon if we had some laws passed dealing with this matter in the near future.

I have attached a copy of some laws on the question that are in force in South Africa, for which I am indebted to Mr. J. Park, of Yamala, who has spent a number of years in that country.

In the destruction of grasshoppers at Gindie, the manager (Mr. Jarrott) has been waging war, as seen by the millions lying dead on the farm; but, unless combined action be resorted to, individual action will be of no avail, for, as fast as they are killed on a farm, they are replenished by more coming from neighbouring properties. Unless an Act is passed, such as that standing on the Statutes of the Orange River Colony, South Africa, the locust plague will, in the near future, be something to be afraid of by the farmer.

The said Act goes so far as to make liable any holder of lands allowing locusts to cross his line on to another property, "while they are in the hopping stage," and, if such is allowed, the offending party is held liable for any damage done to his neighbours by their depredations. The Act also lays down that any owner, knowing of eggs being laid on his farm, must give notice to the Agricultural Department, and he must watch the said eggs till such time as incubation takes place, when he must again notify the Department, and, if he is incapable of coping with their destruction, he must ask for assistance, and that is readily given. The advantage of destruction was so plainly visible that even the kaffirs are always delighted to render aid, as they, being farmers, quite realise the advantage of doing so.

The Department supply on loan "free" spray pumps, and give arsenic and treacle to any farmer applying for them. These are returned to an officer, who is appointed as receiver, at the end of the season.

In every district likely to be largely infested, the Government place a gang of men fully equipped for the purpose of eradication, who are available to any farmer wanting their services—" free."

If a locust inspector finds eggs on a farm, and the farmer has not reported the matter, then a heavy penalty can be inflicted. Since the stringent measures have been put in practice, the writer may say that the total freeing of the colony from the plague has taken place.

One cannot imagine, even in his wildest dreams, the great havoc played by the locust plague. The writer has seen hundreds of acres of maize and other crops, almost ripe, eaten to the ground in a single night, for, if a mob of locusts alight on a crop at sundown, it is good-bye to everything eatable by morning.

The fighting of the locust must be undertaken while the insect is in the hopping stage. They then can be driven into a heap at sundown and sprayed, but when once on the wing nothing can be done; the only thing left then to the farmer is to have smoke fires ready, and, if a swarm seem to be going to alight, then make smoke, which usually stops them.

The first few years the writer was in Africa it was impossible to grow anything; but since the vigorous policy, as above mentioned, has been in force, visitations are a thing of the past, the result being attained only by combined action.

The African locust differs a little from our local one, inasmuch as the former can fly for days without resting and always flies with the wind, whereas the latter seems to fly in short distances. Still, they differ little in their eating propensities.

HINTS TO NEW SETTLERS.—No. 6.

By THE EDITOR.

It may be of service to settlers, in districts at present remote from townships where ordinary household furniture may be obtained, to bring to their notice a material for mattresses which was universally used on farms in bygone times—maize husks. The husk of the cob consists of a coarse outer layer, beneath which are several layers of finer and softer material. These latter are shredded as finely as is required by means of a three-pronged fork, the stalk portion being, of course, cut off. When a sufficient quantity has been thus treated, and it does not take long, the shredded husks are placed in a calico mattress cover, and form as soft and comfortable a bed as can be wished for.

One of the requirements of any household is arrowroot. A farmer need never be short of this useful article of food if he will grow a few perches of the arrowroot plant. Bulbs for planting are easily procured from growers. If planted in September, the bulbs will be mature by the following July. Each plant produces an enormous number of bulbs on rich soil. To prepare the arrowroot, the bulbs after being taken up are first washed, and any roots and shoots are cut off. The next process

is to grate them. This is easily done by making graters out of a piece of kerosene tin, punching holes all over it with a 3-in. nail. This produces the projections forming the grater. The grated pulp and farina fall into a tub or bucket of water, where the farina settles at the bottom, and the pulp is taken out. When a sufficient quantity of starch has settled in the tub, it is stirred up, and then passed through a linen cloth laid over the top of a second tub of water and made fast. The starch and water assisted by stirring pass through the straining cloth, and again the former settles at the bottom. This process is repeated three or four times, always with fresh, clean water. The starch will then be found to be perfectly clean and white. It is quickly dried by being spread on calico sheets in the sun. There is no hard work about it, and it forms a useful occupation for wet days, when indoor work, such as husking corn, making hoe-handles, and grinding axes usually occupies the enforced leisure of the farmer, his family, and employees.

Felling and burning off scrub, stumping, chipping corn, &c., in the summer especially, give rise to great thirst. Various drinks have been used in the field, such as tea, oatmeal water, vinegar and water, hop beer, &c. Of all these hop beer is the most suitable and is neither difficult nor expensive to make. I append a good recipe for making it.

Amongst simple household remedies which should always be kept in a bush home is a specific against snake bite. Although fatal cases of snake bite do not often occur, yet, seeing how plentiful these reptiles are, especially black snakes in the neighbourhood of swamps, and death adders in dry, rocky regions, it is well to be provided with some safeguard in case of accident. This consists of a small lancet, a few grains of permanganate of potash, and a couple of long narrow bandages. The poison of the snake is deposited locally in the part bitten, where it does comparatively little harm, but from this point it is conveyed more or less rapidly by the blood to the internal organs, on which it acts with often disastrous effects. The thing to do is to prevent this and get rid of the poison, and this may be done, if taken in time, by the application of a ligature (a boot lace, string, or strap), then scarifying the bitten part with the lancet, and rubbing in some crystals of the permanganate. It is not generally known, but is nevertheless a fact certified to by the highest authorities on venomous snakes of Australia, that the two most dangerous are the tiger snake and the death adder, and fortunately these are least frequently met with, whilst the species which most often bites man—the black snake—is comparatively inocuous. "It would seem indeed," says Dr. Frank Tidswell, in his valuable book on snake bite and snake venom, "that the black snake rarely, if ever, kills a human being." In a table of deaths from snake bite given in the book named, out of 87 cases of black snake bite there was no death; but 15 out of 33 died from the bite of the tiger snake, 5 out of 10 died from death-adder bite, and 6 out of 32 who were bitten by brown snakes. One piece of advice is given by Dr. Tidswell, and that is—never administer doses of spirits, and do not walk the patient up and down as is the usual custom here.

Pastoral.

RE BLOW-FLY PEST.

[Extract from a letter dated 11th July, 1913, from Mr. F. A. E. FISHER, Poolham, Southbrook.]

As the blow-fly pest is increasing in such proportions as to make serious inroads on the sheep industry, and as the dealing with the same has been intrusted to the Stock Department, I thought probably a few practical remarks on the subject may be acceptable.

In the first place, we have bred the pest up to such numbers that, instead of its natural enemies keeping it in check, the few that are thus destroyed are a mere bagatelle. In many articles from prominent pastoralists burning dead carcasses, offal, &c., are advised, to which I do not in the least agree. As we have been instrumental in breeding them up, it is time we took a hand in helping to reduce them, which is as easy as possible and not expensive. Before describing how to kill them, allow me to wander a little from the subject. The rabbit pest was not beaten in Riverina until the landowners took to killing them by poison, and, when once reduced, saw that they were kept down; and now, in many places that used to employ 20 or 30 men per month, one man has little trouble in keeping 50,000 acres clear. The same with codlin moth. The Tasmanian fruitgrowers were nearly ruined until the advent of arsenical spray. Now they can keep it in check. Later, even the Panama Canal, or rather the country adjoining, is made absolutely one of the healthiest places by killing off the mosquito. Yet we allow our wool and sheep industries to be jeopardised simply by waiting for a friendly parasite to come along and do the work which we *will have to do ourselves.* This is my method:—Any landowner owning sheep should have a cart, and one or two 30 or 40 gallon casks of arsenic water made in the usual way—by boiling, say, 1 lb. of arsenic, with enough washing soda to dissolve it, in 2 or 3 gallons of water; then reducing that by adding 27 or 30 gallons of pure water, making a strength of 1 lb. of arsenic to 30 gallons of water. If advisable, add sugar or anything that will make it more attractive (probably some of the scientific gentlemen could advise on that); fill the casks with poison water, and wherever there might be any offal the cart could go to it, and the driver dip the carcass, if a small one, into the cask and throw it out, and that is all. If any large animal (horse or cattle) died, it should be cut up in pieces convenient to handle, allowed to ripen a little—by leaving it where it died for two or three days—and then each piece dipped into the poisoned water and thrown about the run; say a quarter of a mile apart. Every fly within smelling distance would come and get killed. One man could look after a fair-sized run. Also, at present, if a sheep gets blown, the usual practice is to cut the blown part away and dress with some smelling substance, which only keeps the fly away to go and blow somewhere else. *Why not dress with some poisoned substance that will attract*

instead of driving away? I have poisoned thousands by simply spraying (with an ordinary garden spray pump) horse droppings. I once advised a neighbour of mine in New South Wales to dress his blown lambs with arsenic water, 1 lb. to 30 gallons, instead of sheep dip; and he told me he never dressed a lamb a second time, and previously he often dressed them twice a week.

I might go on much further; but, in conclusion, I am so satisfied that the pest can be kept within bounds that I will convince the most sceptical. All I ask is this: Let anyone get a piece of meat or a dead sheep that is stinking, dip it or spray it with arsenical water; place it under or, say, 10 or 15 yards away from a tree, place a cloth under the tree, if the ground is not bare, and go away for an hour. If there are not a few thousand flies dead under the tree, then something is wrong with the poison. But, mind you, sheep owners will not kill in one year what they have been breeding for thirty years; but, by spending half what they at present lose, the pest in a year or so would be in check.

P.S.—Probably the Department's Chemists could substitute a better poison (more attractive) than arsenic; but arsenic is good enough, and it will not kill the birds, which is all-important.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JUNE, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Nellie II. ...	Shorthorn ...	5 June, 1913	819	3·6	32·76	
Honeycombe	,, ...	7 June ,,	847	3·4	31·87	
Davidina ...	Ayrshire	6 May ,,	572	3·9	24·88	
Cocatina ...	Jersey	19 May ,,	503	4·1	23·07	
Madame Melba	Holstein	22 Jan. ,,	513	4·0	22·92	
Daisy ...	,, ...	2 Jan. ,,	571	3·6	22·84	
Queen Kate	Ayrshire	17 Feb. ,,	465	4·2	21·87	
Nina ...	Shorthorn... ...	11 May ,,	537	3·6	21·48	
Miss Melba	Holstein	22 Jan. ,,	499	3·8	21·13	
Lady Margaret	Ayrshire	26 Mar. ,,	449	4·1	20·59	
Glen ...	Shorthorn... ...	5 Sept., 1912	332	5·2	20·26	
Dilly ...	,, ...	2 June, 1913	536	3·4	20·16	

The Horse.

OUR HORSES.

By ERNEST A. SMITH.

It seems strange that the importance of the horsebreeding industry has never appeared to be properly estimated, for it is one that undoubtedly requires attention. It does not seem to be recognised that horsebreeding in this State is not at present on the same plane as the breeding of cattle and sheep. The grazier breeds cattle in large numbers for beef, and, though in many cases a better discretion in the choice of bulls might be advisable, yet after all, the matter is one that affects his own pocket. The sheep breeder is in the same category. Sheep are bred in large numbers for their wool; and if this is of inferior quality, the owner quickly learns it at the wool sales, and, if a wise man, mends his ways by the infusion of better rams into his flocks. But the average horse breeder is in a different position. Horses are generally bred on a station or farm as an adjunct to other stock. They are bred in comparatively small numbers. In most cases, no stallion is kept and the mares have to be sent elsewhere for service. Horses so bred, when not required for home use, are generally purchased by travelling horse buyers, who, when they have collected a sufficient number, take them to the Toowoomba horse sales, where the Indian buyers are generally in attendance. Under such conditions, it is evident that it is highly desirable that all stallions, particularly those for public service, should be in every way suitable for the improvement of the breed. Up to the present, all that has been done is the examination for soundness of the stallions exhibited at the various agricultural shows. This is undoubtedly a step in the right direction, but soundness, though indispensable in a stallion, is only one of the qualifications necessary for improving the breed. Make, shape, and especially pedigree are all necessary factors.

It is surely to be regretted that horsebreeding for export, which might be one of the most valuable industries in the State, has not received the recognition that the importance of the subject demands. Our export trade to Indian and other Eastern countries might be greatly developed and improved if more attention was paid to the breeding of our horses on proper lines. The importance of this was recognised by the late Hon. J. T. Bell, but his mantle seems to have fallen on none of our present-day politicians, and since his untimely decease the necessity of taking steps to provide against the further deterioration of our general horse supply appears to have been lost sight of altogether. At the present time it seems fitting to call attention again to this important subject, as the source from which our thoroughbred sires are obtained—namely, from the racecourse—seems itself to be in process of deterioration. The sport of racing has increased so greatly of late years that, if not directed and kept on proper lines, it is likely to do more harm than good in furnishing the supply from which sires suitable to improve our general horse stock are to be obtained. It may be laid down as an axiom that there is little worse to breed from than a weedy, flashy, thoroughbred without bone or substance, and nothing better than a good, upstanding thoroughbred

with good bone, substance, and proved staying power. To remedy the present state of affairs, there should, in my opinion, be some hard-and-fast regulations as to stallions standing for public service. Stallions must not only be sound, but they should possess make, shape, and more particularly the blood which will enable them to be prepotent, and thus able to stamp their stock with their own good qualities. In Victoria the official inspections of stallions are not only for soundness but for the general qualities necessary for the making of successful sires. If such were the case in Queensland, and if the registration of all stallions were made compulsory before such were allowed to stand for public service, there would not be such a miserable, half-bred lot of stallions to be seen in the country districts. Owners who keep sires for their own special benefit could not be interfered with, and certainly we have great cause to be thankful to a small number of these for the importation of some high-class sires whose influence must in future years have their effect on our general horse stock. At present, however, these sires are quoted for service at fees prohibitory to nearly everyone except those who breed for racing purposes, and, therefore, they are not, though their sons may be, available to the ordinary horse breeder.

With the matter of horsebreeding the conduct of our racing is inextricably bound up. The multiplicity of short races of 5, 5½, and 6 furlongs that figure in the programmes of most racing clubs are entirely antagonistic not only to real sport but to the production of horses suitable for sires when the time comes for them to leave the post for the paddock. Racing conducted as a sport and as a business are two very different things. Racing as a sport has been the talisman which has made the English thoroughbred renowned throughout the world. England stands pre-eminent in that respect, for without the trials of speed and endurance, the value of breeding would never be ascertained. The racecourse is the only test by which soundness, stamina, speed, constitution, and courage can be determined, and thus prove fitness for stud duties when the turf career is over. But, on the other hand, when racing is conducted as a business as it is by some proprietary clubs, where the almighty dollar is the sole consideration, it has no redeeming feature whatsoever. It provides sport of a kind, it is true, for that section of the public who are never happy without a gamble on Saturday afternoons, but its influence can only be considered as in every way deteriorating both to men and horses. A great deal of the deterioration of our horses is owing to the use of the light, flashy sprinter for stud purposes, thus perpetuating the faults which the present system of racing inevitably brings about. It is presumed that legislative action will come sooner or later if our racing authorities prove to be unable to cope with what is a great and growing evil, but in the meantime less drastic measures might be taken to minimise the evil so far as possible. If the registration of all stallions was insisted on as was unanimously recommended by the recent Conference of Chief Stock Inspectors at Sydney, there should be little difficulty in making the veterinary inspection for soundness a preliminary for examination as to suitability for improving the breed. The issue of certificates to that effect would be particularly valuable to those owners who keep stallions for public service, and should certainly enhance the value of

their stock. No one who has travelled much among the country districts can have failed to notice that the use of inferior sires is almost universal. They are often half-breds with an infusion of draught blood, and, as like produces like, it is no wonder that such stallions, mated with equally nondescript mares, produce animals of a very poor type indeed. Probably the time is not yet ripe for the subsidising of approved sires in the various districts of the State; but, assuming that the taxation of stallions, as advocated by the late Hon. J. T. Bell, is an impossibility owing to the opposition such a measure twice encountered in Parliament, there remains only the alternative of subsidising suitable stallions to stand the season at low fees in the various districts. If a farmer or selector could obtain the services of a first-class sire at a low figure, there is no doubt that he would gladly avail himself of the opportunity, but under present conditions, the fees for the services of such horses are prohibitory to a man of moderate means. The scheme of subsidies, as conducted by the Hunters' Improvement Society in England, where picked specimens of the thoroughbred are available to farmers and others at low fees, might well be followed in Queensland, and, provided the necessary funds could be forthcoming from the annually increasing totalisator tax, it would be a measure that could hardly be objected to. If such could be carried out, it would not be long before a vast improvement would be effected in our horses, while their monetary value would also be largely increased.

We have only to look at the examples furnished by foreign countries to see the great importance of improving our horsebreeding to the fullest extent. In France, Germany, Austria, and Russia, horsebreeding receives the utmost attention from their respective Governments. The authorities spare no expense in purchasing in England the very finest specimens of the thoroughbred that their owners can be induced to sell. France is in particular an object lesson for all countries that still ignore the value and possibilities of successful horsebreeding. In France, as in Queensland, there exists the totalisator (in France it is called the "pari mutuel"), and the proceeds are divided between the charitable institutions and the support of the Government studs (Horas Imperiales) which were established by Napoleon III. In these stud farms, which are situated in various districts, many valuable stallions are kept for the use of farmers and others, the cost of service being nominal and the Government only reserving the right of purchasing the progeny of such sires at a fixed price if they are required for military purposes. Here a very different state of affairs exists. The totalisator tax, which is increasing year by year, goes into the Consolidated Revenue, while hospitals all over the country are crying out for pecuniary assistance and our horsebreeding industry is totally ignored.

In France the justification for this expenditure on horsebreeding is that it is necessary to promote the efficiency of their cavalry—in plain language for the purposes of war. Here, in Queensland, encouragement of horsebreeding is required for the purposes of peace, for promoting a most valuable industry, for increasing our export trade, and thus adding appreciably to the revenue, prosperity, and progressiveness of our State.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1913.

Three thousand five hundred and six eggs were laid during the month. Owing to many of the birds being in moult, there has been a falling off in the laying; still several of the pens are doing excellent work. Mr. Padman again wins the monthly prize with 139 eggs. The following are the individual records:—

Competitors.	Breed.	June.	Total.
A. H. Padman, S.A.	White Leghorns ...	139	424
J. R. Wilson	Do.	114	352
T. Fanning...	Do. (No. 2)	110	350
O.K. Poultry Yards	Do.	112	344
F. McCauley	Do.	86	322
Loloma Poultry Yards, N.S.W.... ..	Do.	133	314
J. D. England	Do.	112	314
J. Zahl	Do.	118	307
S. E. Sharpe	Do.	133	302
Moritz Bros., S.A.	Do.	114	302
J. F. Coates	Do.	97	296
Cowan Bros., N.S.W.	Do.	68	289
H. Tappenden	Do.	97	288
E. A. Smith	Do. (No. 2)	67	286
Jas. McKay	Do.	92	285
Range Poultry Farm	Do.	115	279
Mrs. Sprengel, N.S.W.	Do.	58	277
R. Jobling, N.S.W.	Do.	91	272
Mrs. J. R. D. Munro	Do.	64	255
J. Gosley	Do.	93	251
Doyle Bros., N.S.W.	Do.	102	247
R. Burns	Black Orpingtons (No. 2)	107	242
A. T. Coomber	White Leghorns ...	97	237
Yangarella Poultry Farm	Do.	65	237
R. Burns	Black Orpingtons (No. 1)	121	234
W. D. Bradburn, N.S.W.	White Leghorns ...	70	235
A. F. Camkin, N.S.W.	Do.	90	223
D. Grant	Do.	60	222
A. Schbrowski	Brown Leghorns ...	101	206
E. A. Smith	White Leghorns (No. 1)	48	204
J. Murchie...	Brown Leghorns ...	31	200
Mrs. Craig	White Leghorns ...	68	189
T. Stephens, N.S.W.	Do.	89	189
H. Hammill, N.S.W.	Do.	71	181
J. Archibald, N.S.W.	Do.	88	180
J. Andersen, Victoria	Red Sussex	61	178
C. Leach, N.S.W....	White Leghorns ...	63	166
Mrs. Bieber	Brown Leghorns ...	31	154
T. Fanning...	White Leghorns (No. 1)	100	150
A. C. Collis, N.S.W.	Do.	30	123
Totals	...	3,506	10,096

BLEACHING WHITE ORPINGTONS.

A correspondent interested in poultry sends us the following extract from an English paper:—

"The art of turning a yellow or brassy topped bird to a snow-white colour is practised by some breeders. A good many folks say this could not be done, while others say it can. Of course, there are strains of the breed which are 'stay whites.' An American financier, Mr. L. Walker, writing on the point, says:—'I am only too glad to tell all I know, as I think it is just as legal as a sprinkling of blue in the water—one is blue and the other is white. I will start with the peroxide process first. After the bird is washed and most of the water absorbed in the towels, take 3 parts of peroxide of hydrogen with 1 part of strong ammonia, mix together, and sponge the bird over quickly. Then wrap up the bird with an oiled silk, leaving the shanks and head out free. The idea is to keep in the gases generated by the two chemicals. This causes the bleaching. The length of time of bleaching should take 3 minutes or more. Better practise on a couple of culls to get your hand in. The next process is the chloride of lime. Take 1 tablespoonful of chloride of lime, 2 tablespoonfuls of oxalic acid crystals, 1 handful of borax, and mix them together; put this mixture into 1 gallon of hot soft water, and stir it well. Then shave up 3 cakes of pure white soap and add slowly, stirring all the time. This will make a jelly, which can be put away in sealed cans for future use. Wash the birds in the usual way, but use the jelly instead of soap. If this method is used, blueing can be used in the last water in the usual way. This is all I know about bleaching, but I do know that I can get them as white as the other fellow. I live in a smoky locality, and I notice that the blacker the bird is the whiter it will be when washed. I think the black resists the hot sun, as I know the sun is responsible for most brassiness. I have made male birds run out in the pen all summer that looked like Black Orpingtons, and after they were washed they beat male birds that have never been outside the coop. I have seen white birds that were as blue as Andalusians, made so to protect the feathers from the scorching sun.'"

Another writer says:—"The idea of using either oiled silk or even ordinary flannel to wrap up a bird is an excellent idea, but Mr. Walker's statement that 3 minutes is sufficient to produce the bleach with peroxide of hydrogen is, in my opinion, wrong, as very often peroxide of hydrogen is rather slow in commencing the liberation of nascent oxygen; I assure you that not less than 6 hours is required, and, further, the slower the liberation of the oxygen, the better its bleaching effect. As to the chloride of lime process, I have carefully followed his prescription, and I regret to say that the bleaching effect he claims I find is non-existent. In the first place, the addition of oxalic acid to chloride of lime is correct, as it will liberate free chlorine, which is the bleaching agent, but, unfortunately, the addition of borax immediately neutralises the acid, and with the addition of soap there is precipitation of insoluble lime soaps, which would render any feathers somewhat sticky and prevent them webbing out freely. I do not want any reader to think that Mr. Walker is mistaken, but I find from various lots of feathers I have had that there is brassiness in some feathers which yields to treatment, and, again, in other feathers the same degree of brassiness will not yield at all."

State Farms.

HELIANTHI (HELIANTHUS MACROPHYLLUS) AND RHODES GRASS.

By C. E. WOOD, Manager, Kamerunga State Nursery, Cairns.

Although it was hardly expected to obtain anything like the results claimed for this plant, still, even allowing for our conditions of climate, it was thought that a plant laying claim to such high feeding qualities, not only as a green fodder, silage, and hay, but also on account of the heavy crops of tubers which are said to be readily eaten by all kinds of stock, was well worth giving a trial, even on the coastal lands of North Queensland. To this end, application was made to the Department of Agriculture for tubers. These were evidently unobtainable in the State; but in December, 1912, a few seed were received which had been obtained from England. Owing to the dry conditions prevailing at time of their receipt, a few seed were planted in a box, and the resulting plants were put out in the field on 15th January of this year; a good start in growth was made, but, unfortunately, owing to a cyclone on 30th January, followed by 14 in. of rain in 24 hours, the plants got badly knocked about. Whether the subsequent failure of this plant to produce any signs of tubers was due to damage done at this time is still to be proved, but the fact remains that growth was poor, the tallest plant being only 3 ft. high; but, although both flower and seed were produced, the plants died down without there being a sign of the smallest formation of any tubers. The soil in which they were planted was good, and had been well worked.

Another planting was made on 26th March. These plants are looking fair; and, should any good results follow, further references will be made to them in this journal, as a plant possessing so many good qualities should be an acquisition to the farm.

CHLORIS BARBATA *V.* RHODES GRASS.

As it is always best to have a variety of grasses for pasture, after reading the good accounts of the abovenamed grass a packet of seed was procured from Mr. J. J. Chisholm, of the Plains Prairie, who, in the May (1912) journal, gives a glowing account of its success in his district. He also states that Mr. Brünnich, Government Agricultural Chemist, says it compares favourably with Rhodes Grass.

The seed was set in a box, and germinated well. Another box was planted with Rhodes Grass for the sake of comparing growth; this seed also germinated well, and, later, 3 rows of each grass were planted in the field and allowed to come to seeding. From the start the *Barbata* had a thinner growth of blade, but the flower stems were numerous, and from the free way it seeded I was afraid it might become a bad weed in cultivated land. On 11th March both grasses were cut in the

hope that the *Barbata* would make better growth. On 23rd April both were in full flower, but again the *Barbata* showed very poor and weak growth of blade but plenty of flower stems, so that in this wet district it cannot at present compare with Rhodes as a pasture grass. It remains, however, to be seen how the two grasses will compare during the drier months.

Since making the above notes, I have had the opportunity of visiting the new State Farm at Kairi, in the Atherton district, where Rhodes Grass is the chosen grass. A good stand has been secured in two big clearings, and it can truly be said that in this district Rhodes Grass has found a natural home; and, taking this for an example, it is to be hoped that many others will see the advantage of laying down similar paddocks for the purpose of building up the vast dairying industry which will asuredly follow the closer settlement of such a rich fertile district, also that the vast areas of land now held by Chinese "who grow only corn" will be converted into prosperous dairy farms supporting many facilies of our own race.

At Kairi I saw a plot of *Chloris barbata*, and, although, as it was to be expected, the growth was decidedly ahead of that attained on the lowlands of the coast, there will be few, if any, who are likely to trouble about a grass the returns from which would be nothing compared with Rhodes.

THE USES OF TALC.

Talc, derived from soapstone found in various quarters of the world and in many States of our Union, is, as a general thing, marketed as rough from the mine. It is sawed into slabs, from which are manufactured various objects, or it is ground into powder.

A great deal of the ground talc is employed in the manufacture of paper. It also enters into the making of moulded rubber forms and foundry facings and paints, but the form in which it is most familiar is the toilet powder.

Not only is talcum dusted into gloves and shoes to obviate friction, but it is also blown into conduits to ease the introduction of electric wires or other conductors.

Soapstone is largely employed in the manufacture of laundry tubs and similar articles. The very best grades of talc, free from flaws, are sawed up to make pencils or crayons. Gas-tips are also made from talc.

[The above notice of the uses of talc, taken from "Harper's Weekly," does not indicate its reputed use in the renovation of damaged rice. Old, discoloured, worm-eaten rice is said to have been so treated that it takes on the appearance of new rice. Grain so treated has been reported to have proved very injurious to native labourers in tropical countries, whose food rations consist largely of rice.—Ed. "Q.A.J."]

The Orchard.

THE ALPHONSE MANGO.

BY S. H. PRAYAG, B. Ag., Bombay Agricultural Department.

(*From the "Agricultural Journal of India."*)

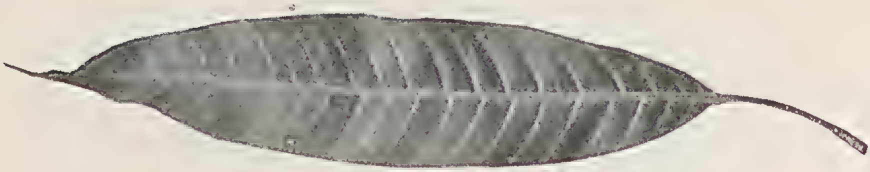
The Alphonse (commonly called Apoos) mango is one of the most highly prized fruits of India. It has been called by some the "Prince of Mangoes." Mr. Woodrow, in his book on "Gardening in India," mentions that it is universally admitted to be the finest of all varieties of mango. In the Journal of the Royal Horticultural Society, page 775, vol. 26 (1901-02), Maries has made mention of the Alphonse mango, and regards it as the most delicious fruit and a general favourite. Personally I prefer this to all other varieties, as it excels others in every respect, though to some the taste is not so agreeable as that of the Pairi.

Regarding the origin of the Alphonse, there appears to be still a doubt. Maries says that this variety originally came from Salem, in Madras Presidency, and is now generally grown in Bombay gardens. But its original home seems to be Goa, as the name "Apoos" (a corruption of the Portuguese name "Alphonso") indicates whence it must have been spread by man.

Though it may be supposed to have come originally from the Goa, the Bombay Alphonse is inferior in every respect to the Goa Alphonse. The Bombay Alphonse is smaller in size, scarcely weighs more than 350 grammes; whereas the Goa Alphonse weighs from 375 grammes and upwards, and is more delicious. The Goa Alphonse has a left shoulder higher than the right, and has a slightly perceptible beak; but the Bombay variety is almost entirely lacking in the beak. (See Plates 91 and 92.)

The Goa Alphonse has been said to be the true Alphonse. To what circumstances its superior merit is due—whether to any peculiarity in the soil or climate—is hardly possible to decide. But this excellence in fruits in favoured localities is not confined to the mango. It is found in connection with most fruits in many parts of India.

The skin of the Goa Alphonse is greenish yellow with reddish orange on the exposed shoulder. In measurements it is 9 x 6 x 4·5 cm. in the sample that I took. Though to some the taste is not superior to that of Pairi, its value is greatly enhanced by its keeping quality. A true Alphonse can be preserved for at least a fortnight after it is ripe, and hence can be safely sent to foreign countries when it is unripe but fully developed in size. Its cultivation is now extending, as it finds a ready market in many places. We find this variety the most frequent in almost every private gentleman's garden.



LEAF OF THE ALPHONSE MANGO TREE.

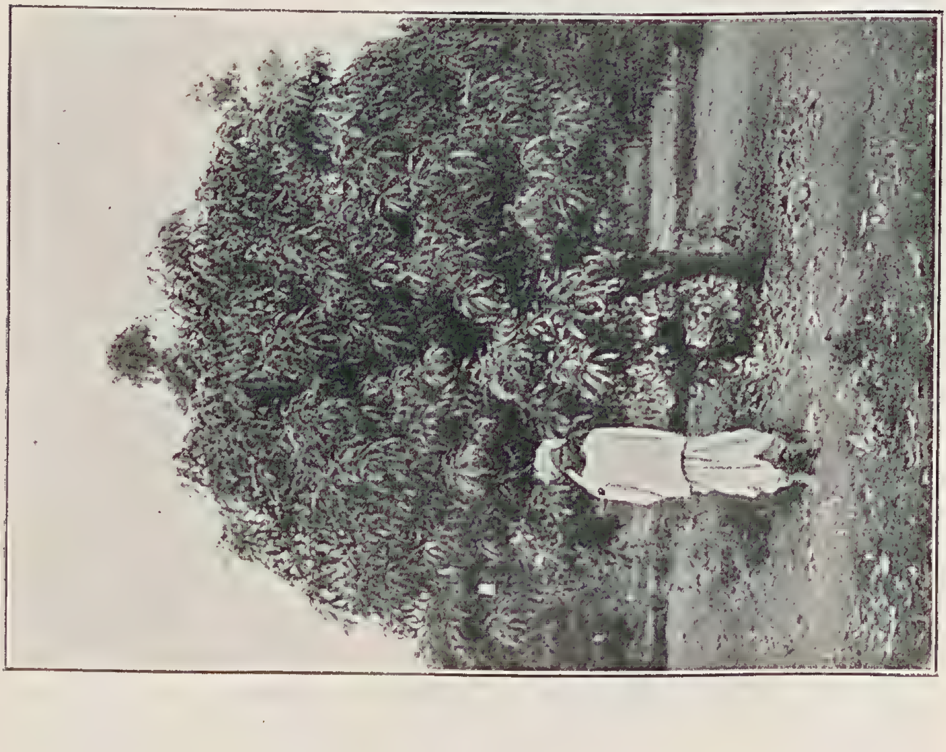
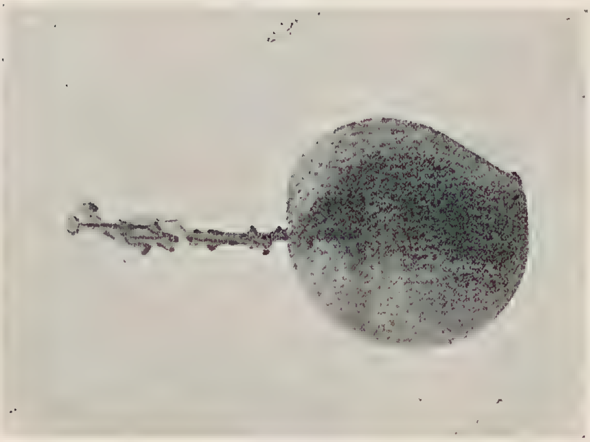
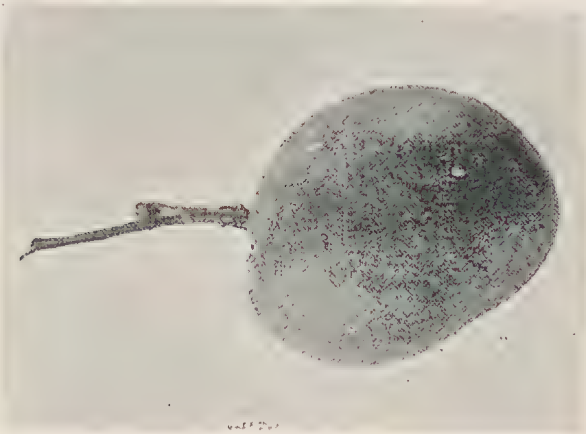


PLATE 91.—ALPHONSE MANGO TREE.

PLATE 92.—ALPHONSE (BOMBAY).



KALA APOOS.



GOL APOOS.

In the Bombay market the bigger sorts of true Alphonse varieties of Goa are occasionally found, but these are sold very dear, sometimes as extra special quality. In favourable seasons they are sold from Rs. 2-8 to Rs. 3 a dozen; whereas in 1912 they were sold at Rs. 6 a dozen. In some parts of Goa they are sold at the rate of 11 to 14 rupees per 100, whereas in favourable seasons they are sold at Rs. 6 to 9 per 100. The price, however, fluctuates, according to the markets and according to the seasons of the year.

Many of the Mankurad varieties of mangoes found in Goa are sold in Bombay as Alphonse. This is a variety nearly allied to Alphonse, and closely resembles it in all respects except in size. It is a smaller fruit, like the Bombay Alphonse. (See Plate 92.)

SUB-VARIETIES.—There are three sub-varieties of Alphonse—viz., Gol, Kala, and Kagdi Apoos.

Since I could not get the Kagdi Apoos, I shall describe here the other two varieties.

Kala Apoos.—The fruit has the flavour of Apoos. A few months old bark of this three is dark in colour. The leaves are also dark-green in colour. Owing to these peculiarities, it is named Kala Apoos. The beak is prominent in this variety.

Gol Apoos.—It resembles Alphonse in all respects except the shape, which is round more or less, and hence the name "Gol Apoos."

CHARACTERISTICS OF THE TREE AND LEAF.—The leaves of the Alphonse vary very much in size. In a good Alphonse tree the leaves are dark-green with a white midrib. Mr. Woodrow mentions that among the choice varieties the leaves of Alphonse may be known by the bright red midrib apparent until the leaves are nearly ripe, but I have rarely seen this.

In a collection of trees, it is extremely difficult to distinguish the Alphonse trees by the leaves and the nature of the tree only.

The smell of the leaves has been considered by some as one of the distinguishing fatures of identification, but this, too, sometimes fails. The tree is rather stunted, and rarely approaches graceful symmetry. The tree is not very hardy.

The tree shown opposite is nearly seven years old. The above description applies to the Bombay Alphonse; whereas the Goa Alphonse trees are free growing and of monstrous size, attaining the height of 60 to 80 ft. and even more, and bearing profusely—sometimes as many as 10,000 fruits—thus proving what a tree can be like when situated in favourable localities both as regards soil and climate.

BANANA DISEASE IN THE CLEVELAND DISTRICT.

The following report on a disease which has appeared in Cavendish bananas in the above district has been furnished to the Under Secretary for Agriculture and Stock by Mr. E. Jarvis, Assistant Government Entomologist. When the Department was notified of the occurrence of the disease, prompt measures were taken to investigate the cause and to discover a remedy. Mr. Jarvis and Mr. Ross (Instructor in Fruit Culture) were instructed to proceed to Cleveland and report upon the disease, and, if possible, to suggest the means of combating it:—

I have the honour to report that, on the 17th June, I visited Cleveland, in company with our Fruit Expert (Mr. C. Ross), to investigate a disease of Cavendish bananas that is very prevalent in the district and causing considerable alarm.

Mr. W. Taylor's plantation was first inspected, and, being badly affected, afforded us ample opportunity for studying the disease and observing its characteristic symptoms.

These may be briefly described as follows:—

EXTERNAL.

1. A sickly appearance of the plant caused by the premature drooping and decay of its lower leaves, the stalks of which are abnormally blackened and their bases brown and partially decomposed.
2. A conspicuous rotting of the base of the fruit stalk or "handle."
3. Fruit decay, causing a dark discolouration of the central 3-rayed space, which is more or less hollow and filled with a transparent gelatinous substance very noticeable when a banana is split lengthwise down the centre.

INTERNAL.

4. Stem decay, producing brown marginal areas of varying lengths and widths, seen when the main stem is sectioned horizontally about 1 ft. above ground level; or in more advanced stages occurring in the form of irregular greyish central patches close to the ground surrounded by an outer band of similarly discoloured tissue.
5. Root decay, producing conspicuous blackened areas, an inch or more in length, which may appear as narrow bands, or, in a more advanced stage of the disease, cause darkening of a greater portion of root substance.

The above-mentioned plantation was situated on low and nearly level ground, which, although fairly well drained, has been in a continuous wet state for the last eight months; and the owner informed us that he first noticed the disease in February amongst bananas growing on the lowest level, and thought that the recent long spell of wet weather might be responsible for the trouble.

Although continued wet undoubtedly favours the development of various parasitic fungi and bacteria, it does not, of course, affect all sorts of plants in the same way; but I think we may assume that, had the past season been drier, growers might have been spared this unwelcome visitation.

The disease appears to me identical with one already investigated by the Government Entomologist, and recorded as causing great mortality among Cavendish bananas at Cairns.

It is interesting in this connection to note that Mr. Tryon writes:—(1) "No parasites are constantly present in the blackened root tissue." (2) "The disease is more apparent during the wet months (February and March) than at any other time of the year, and it is not equally pronounced every season." (3) "It is commonly stated that it is perpetuated by the employment of 'suckers' derived from affected plants, even although these 'suckers' evince no evident sign of disease themselves."

The precise cause of the malady is unknown, and diseases of this kind, when firmly established, are practically incurable, but it is to be hoped that in the present instance many plants may eventually recover when spring weather commences.

With regard to the question of the dissemination of this disease by means of unhealthy suckers, it seems that most of the bananas now affected were originally obtained from Mount Cotton, where a disease similar to the above is known to occur, and a few from Redland Bay. Possibly cultural methods, other than those relating exclusively to soil conditions and drainage, may tend to make bananas susceptible to such diseases; this question, however, is one that can only be decided by experiment in the field.

Our thanks are due to Mr. E. Smallman, of Ormiston, for his hospitality and kindness in driving us to affected selections.

FRUIT CULTURE AT CABOOLTURE.

Our illustrations afford good evidence of what can be achieved in fruitgrowing by hard work, intelligence, and perseverance. They show part of the citrus orchard, and of the house, belonging to Mr. H. Rutter, at Elimbah Creek. The orchard is situated 6 miles from Caboolture, and was taken up 24 years ago by the present owner, who at that time had had no experience on the land, and knew nothing of fruitgrowing. This was just at the beginning of "bad times" for the man on the land, but Mr. Rutter alternated clearing a portion of his selection with taking outside employment to keep his family and the home together. As soon as a fair amount of land was ready, the idea struck him to obtain some oranges, mandarins, and mangoes, the latter at the time costing from 4d. to 6d. each per fruit.

PLATE 93.—PARTIAL VIEW OF MR. H. RUTTER'S HOUSE, ELIMBAH.

PLATE 94.—PART OF ORCHARD, SHOWING ORIGINAL FOREST, ELIMBAH.

Plate 95.—A Prolific Mandarin Tree at Elimbah.

The mango seeds all germinated, and made nice young trees, but, owing to his want of experience, he planted them too closely together, about 15 feet apart, instead of 50 feet, seeing that some of the trees are now branched out to 40 ft. After a time he began to gain experience, which is a good schoolmaster. But, as he says, "Sometimes we learn too late." However, he soon discovered that the best distance for orange-trees was about 30 feet, and for mandarins a little less. Up to about eight years ago, all his trees were seedlings, but since then he has planted several worked trees, although he says that, if he had to start again, he would not have any worked trees, because he has always had excellent reliable fruit from his seedlings, and trees raised from such fruit have always come true to name. Mr. Rutter has about 5 acres of trees of various ages, from 24 years to 24 months old. He has never calculated their average production, but he notes that he took 24 cases from one orange-tree three years ago. This year, from three mandarin-trees, he gathered 890 dozen fruit, and one Emperor mandarin yielded 28 cases. A seedling Beauty of Glen Retreat gave him 280 dozen, and by the time he has gathered all its crop he reckons it will have yielded quite 500 dozen. The land on which these splendid results have been obtained is all forest land, the soil in some parts being red, and still redder at a depth of 3 feet or 4 feet. In other parts the soil is sandy. The whole of the work of breaking up, making holes, &c., has been done by hand, dug to a depth of 18 inches. "Slow work," he says, "but it paid me well afterwards." Very little has been done in the way of spraying, as most of the trees are clean and healthy, only an odd tree now and then requiring attention.

Mr. Rutter, wisely, does not believe in taking all he can out of the land without putting anything back to keep up its fertility. Every season the trees are well manured. Two years of dry weather "played up" with them somewhat, but the rains during the last eight months brought them on splendidly, showing that if he could irrigate during a dry time he would get even better results. The varieties of oranges planted are St. Michael, Valentia, Late Jaffa Oval, and Jaffa Round, some common oranges, and others unnamed. The mandarins comprise Scarlet Emperor, Glen Retreat, Ellendale Beauty, and others. There are also Lisbon lemons and citrons just beginning to bear. His opinion of fruitgrowing is that it is a very genial occupation. When he first began to plant oranges, people used to ask what he was going to do with all the oranges, telling him he would never be able to sell them. So far from this pessimistic prophecy being fulfilled, his trouble is that he has not got enough trees, as, for the last two years, prices have been the best he has ever known.

Plate 96.—Bengal Lemon, Grown by Mr. H. Rutter, Elimbah, $18\frac{3}{4}$ Inches in Circumference.

PLATE 97.—SCARLET EMPEROR MANDARINS, GROWN BY MR. H. RUTTER, ELIMBAH. (NATURAL SIZE.)

The foregoing only goes to show what an energetic man can do even if he starts with the handicap of want of funds. To-day Mr. Rutter is an independent man, and owes all to his own pluck and intelligence. The fruit shown in the illustration is a fine Bengal lemon and two Scarlet Emperor mandarins as nearly natural size as the dimensions of the journal will permit.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1913.	June, 1912.
North Coast.	In.		In.	In.
Atherton	1·91	11	0·85	3·14
Cairns	2·27	25	0·62	8·00
Cardwell	1·62	25	0·55	8·05
Cooktown	1·92	25	0·64	6·03
Herberton	0·97	25	0·72	2·36
Ingham	1·88	20	0·52	13·31
Innisfail	6·44	25	1·84	15·25
Mossman	3·46	5	0·69	8·88
Townsville	1·20	23	0·54	4·49
Central Coast.				
Ayr	1·22	25	1·73	6·70
Bowen	1·53	25	5·42	3·78
Mackay	2·41	25	3·75	5·51
Proserpine	3·53	10	6·69	4·41
St. Lawrence ...	2·04	25	4·82	6·98
South Coast.				
Crohamhurst ...	4·37	20	4·22	9·99
Biggenden	1·91	14	3·68	4·58
Bundaberg	2·55	25	3·45	10·23
Brisbane	2·66	62	4·65	7·27
Childers	1·85	17	3·71	9·68
Esk	1·64	25	4·76	7·43
Gayndah	1·52	25	2·91	4·75
Gympie	2·15	25	5·28	5·07
Kilkivan	1·67	25	4·53	4·96
Maryborough ...	2·59	25	3·48	9·12
Nanango	1·68	25	4·58	6·31
South Coast—continued:	In.		In.	In.
Rockhampton ...	1·77	25	3·55	8·38
Woodford	2·44	25	3·94	9·78
Yandina	3·68	19	4·39	7·42
Darling Downs.				
Dalby	1·52	22	4·17	4·76
Emu Vale	1·32	17	4·47	4·05
Jimbour	1·49	24	4·15	3·99
Miles	1·50	25	4·14	7·70
Stanthorpe ...	1·73	22	3·93	4·67
Toowoomba ...	2·05	22	5·73	6·75
Warwick	1·50	22	3·42	5·69
Maranoa.				
Roma	1·64	21	3·15	7·06
State Farms, &c.				
Gatton College ...	1·53	14	4·69	6·63
Gindie	1·50	13	4·53	9·94
Kamerunga Nurs'y	2·85	23	0·39	...
Kairi	...	...	1·01	7·22
Sugar Experiment Station, Mackay	2·20	16	3·83	...
Bungeworgorai ...	...	...	2·73	7·06
Warren	...	...	3·51	9·51
Hermitage ...	2·01	7	3·96	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Tropical Industries.

THE MANGOSTEEN FRUIT.

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

To those who have followed the history and vicissitudes of the *Garcinia Mangostana* in North Queensland, a few notes with the accompanying illustrations of the matured fruit will be of interest.

During the process of development several of the fruits on the tree at the Kamerunga State Nursery fell off. Ten, however, attained maturity. The first ripened and was plucked on the 29th of May, while the last is not off the tree at date of writing (third week of June). As a matter of fact, two fruits are still on the tree, one of which is much behind the other in point of ripeness or maturity. Three of the ripe fruits were sent to the Under Secretary for Agriculture and Stock, Brisbane, on the 4th of June, and one to the Instructor in Tropical Agriculture, Cairns, on the 13th June; the rest have been, or are being, kept for the purposes of propagation.

The largest fruit obtained, on measurement, proved to have a circumference of 8.25 in., diameter of 2.75 in., and a weight of exactly 4 oz. Others measured 7.75 in. in circumference, 2.60 in. in diameter, and weighed 3¼ oz.; and 7.5 in. circumference, 2.5 in. diameter, and 3 oz. in weight. The fruit was as nearly as possible globular, therefore all were opened transversely, and the diameter measurements taken that way. From stalk to tip the diameters would probably have been slightly more. In colour the fruit were a bright reddish-purple, which deepened after plucking slowly day by day to a deep rich purple. On being cut, the half-inch-thick rind was found to retain throughout the brighter reddish-purple of the fruit before gathering, contrasting grandly with the pure white of the interior. The flavour left nothing to desire.

The specimen sent to Cairns was plucked on or about the 9th June, was kept on view in the Agricultural Offices there till the 25th, and opened in perfect condition on the evening of that day. Those sent to Brisbane were also received in good order. The fruit, therefore, has shown that it will keep long enough to travel from the North to the Southern parts of this continent. These were, of course, packed carefully, and rather more attention accorded them in this respect than would be expected if consigned on a commercial scale. Though no test of rough packing or bulk handling was possible with the small maiden crop of this fruit obtained at the Kamerunga State Nursery this year, the indications are that this fruit, with ordinary care and reasonable packing, would travel well. It would certainly seem to keep longer, and in far better condition, than any of the better class mangoes.

Those who had not seen this fruit before expressed surprise, when it was on view in Cairns, at not finding it, as they had anticipated from

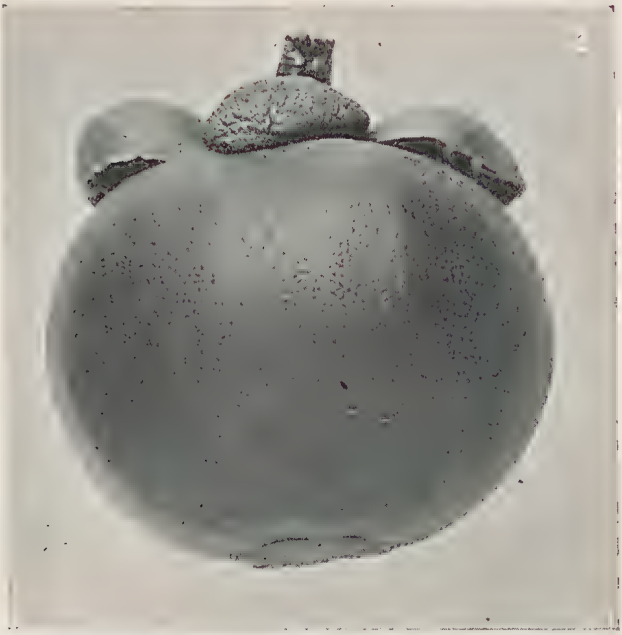


PLATE 98.—THE JAVA MANGOSTEEN AT KAMERUNGA STATE NURSERY.

the similarity of the name, more like a mango—a perhaps not inexcusable misconception.

The contents of the fruit varied from five to seven quarters or divisions, mostly six. No more than two of these contained seed in any case, often only one. The seed appeared thin and weak, and their vitality is doubtful. This is not unnatural with new plants or trees on their first bearing in new localities, and should few or none of the seed now obtained prove fertile, the next crop will probably be found full and strong. Now that the tree has commenced to bear, it is anticipated that a crop will be obtained annually. No plants are available for distribution yet, nor will any be available this season.

The tree remains healthy and is putting on new growth. It is satisfactory to note that the part of the tree that was slightly damaged by the cyclone last season is fast recovering, and everything points favourably to a more extensive flowering in the coming season.

Fig. 1 of the illustrations depicts four fruits with leaves of the tree. The general appearance of the opened fruit can also be seen and the two quarters that contain seed can be picked out readily by their size. Fig. 2 gives an idea of the size of the mature fruit, and Fig. 3 of the shape of the interior and edible portion as well as the thickness of the rind.

ELECTRICAL TAPPING OF RUBBER TREES.

LABOUR-SAVING INVENTION.

TO REVOLUTIONISE THE INDUSTRY.

According to "The India Rubber World" of New York, there appears a possibility of the old system of rubber tapping, which has existed for nobody knows how many centuries, being superseded by a new invention of a German scientist, Mr. George M. von Hassel, who has been employed for many years by the Peruvian Government to explore the resources of its rubber territory. This gentleman (says our contemporary), who is a civil engineer by profession, has devised a method of extracting rubber from the tree, which, if not instantaneous, is at least rapid and efficacious in its operation, and, if it works out in practice as it has given promise of doing in the various tests to which the process has been subjected, it may probably be adopted. Here, briefly, is the apparatus that he has devised:—He places upon the trunk of the rubber-tree a piece of sheet iron about 5 ft. long, 5 in. wide, with the two sides folded back against the tree to a thickness of about 2 in., constituting a hollow channel of sheet iron. This hollow channel is divided into a series of 15 to 30 sections; the number of sections depends upon the number of days the apparatus shall be worked. Each section has a mechanism for the extraction of the latex from the rubber-tree and a receptacle for receiving the flow, which also contains a preparation for the coagulation of the latex. When working Hancornia and Castilloa trees, plates provided with longitudinal canals are used instead of the receptacles for gathering the latex, and the product thus obtained is known as "Sernamby." This product is gained in the form of threads without the aid of acids or other chemical substances.

The method of operating is as follows:—This channel of sheet iron, with the above described mechanism and receptacles, is fastened against the rubber trees. If it is a small tree, there will be two of these devices; if it is a large tree, there may be as many as nine circling the tree and about a handspan apart. This apparatus is connected by an insulated wire with a central station which is equipped with electric power. A machine devised by the inventor makes it possible to send the electric current so that it will set the first section in motion. The latex then oozes out and flows into the receptacle immediately beneath. In the receptacle there is an acid preparation that coagulates the latex, converting it into rubber. The next day—or, preferably, 48 hours later—the current is turned on again affecting the second section, which in turn pricks the tree, bringing forth the latex, which drips into the second cup and is there similarly coagulated. After another interval of two days, the third section is set in motion, and so on for the 15 to 30 sections, which are operated from the central station, tapping the tree and filling the receptacles with rubber. It is not necessary to examine the tree until the expiration of 60 days, when a handful of rubber will be found in each of the receptacles, and on a large tree when there are none of these devices—each with 30 cups—there will be 270 lumps of coagulated rubber waiting for the gatherer. It is stated that the same current that does the work on one tree can do the work on 5,000 trees by simply equipping that number of trees and connecting by the insulated wire, so that the electric current can be communicated. In an actual test already made, between 50 and 60 trees have been tapped at one time from the central station.

According to Mr. von Hassel, the advantages are as follows:—First, the enormous saving of labour, one man being able to do the work of forty under the old system; secondly, the power to tap trees in the swamps, which cannot often be approached by the tapper; third, the fact that the trees can by this process be tapped very early in the morning before the sun is up, when the latex flows more freely; and fourth, the fact that the trees cannot be injured by this process as the punctures are very small and heal rapidly.—" H. and C. Mail."

RUBBER DIVIDENDS.

The fear is entertained by some that a fall in the price of rubber to 3s. per lb., and that synthetic rubber will eventually push natural rubber so hard that, in the end, rubber plantations will cease to be profitable. Such fears are unreasonable. The chemical manufacture of rubber equal to natural rubber has a long weary journey to go, and may possibly never reach the goal; whilst rubber plantations will yield a very handsome profit at 3s. per lb. In proof of this we take the following notice from the " Mindanao Herald," published in the Philippines:—

We note the annual report of the Karan Rubber Estate, recently read at the annual meeting of its stockholders in London, indicates that

this estate has 921 acres under rubber and 94 under coconuts, at the capitalised cost of £37 per acre.

The rubber is planted 120 trees per acre, there being 85,000, of which 64,566 were tapped during the year, representing the plantings of 1905, 1906, and 1907. During 1912 the tapped trees yielded 2 lb. per tree.

Of the area in coconuts 35 acres are mature, but are so closely planted that returns were disappointing, and thinning out of the trees is contemplated.

The cost of the rubber production f.o.b. ship at point of shipment, including depreciation on buildings, plant, and machinery and commission to staff, was 1s. 5.24d. per lb. Adding to the above the marketing charges together with London office fees, directors' fees, legal charges, provident fund, audit fee, &c., brings the total cost of production per lb. up to 1s. 8.62d.

After setting aside a development fund of £2,700 for the coming year, there was declared a second dividend for the current year, making a total annual dividend of 42½ per cent. This company declared dividends in 1910 of 7½ per cent.; in 1911, 12½ per cent.; and in 1912, 42½ per cent. The prospectus of the company estimated total dividends up to this time at 43 per cent., while they have actually paid 62½ per cent. The gross price realised for the rubber during the year was 4s. 5.24d. per lb.

THE DINGO PLAGUE AT THARGOMINDAH.

Mr. Arthur Temple Clerk writes to the "Brisbane Courier":—"Having noticed in Friday's issue that the Thargomindah district is suffering from a plague of dingoes doing much havoc among the stock, as an old Northern pioneer pastoralist of this State, who suffered heavily from the calf-killing propensities of the dingo, may I ask for space to make known my way of poisoning dingoes, which I feel convinced your readers will find a very easy and most effective way of exterminating them:—Take the inside fat of a beast; beat it in a mortar until it is one solid lump and pliable; then take a piece as large as a piegon's egg, roll it between the palms of your hands till it is a round ball; then open with your pocket knife and insert the strychnine in the centre; squeeze the ball together again. Put all your pills in a paper, and in a saddle bag; then start out on horseback through your paddocks and lay a pill every 500 yards or so, under a bush, always under the east side of the bush so that the midday sun cannot get at it. The most important part is the laying of the poison. To lay it so that a dingo will pick it up you must place a small handful of grass on the ground and put your pill on the grass, and then light the grass. As it flares up round the pill the flames singe off all the smell of the hand and give the pill at the same time a nice odour, which the dingo will trace a hundred yards off. I have never known a dingo to pass a pill made in this way. You will not find the dingo close to the poison, as the fat does not dissolve quick enough for that, but that he will die you may rest assured."

Animal Pathology.

TRAPPING SHEEP-MAGGOT FLIES.

BY E. JARVIS, Assistant Government Entomologist.

One of the many remedies that have been suggested for coping with this notorious sheep pest, whose recent ravages have caused such consternation both here and in New South Wales, is that of trapping the adult flies.

When we consider that a single female specimen of the Common Sheep-Maggot Fly (*Lucilia serricata*) is credited with laying about 500 eggs, and probably " strikes " several sheep, a method of this kind which might enable us to capture thousands of these flies appears worth a thorough trial, and may eventually prove an effective means of control.

The life-cycle of this insect is completed in about a month, and there are probably five or six broods each year, so that the number resulting from the progeny of one female fly hatched early in the season would, if unchecked, easily run into hundreds of millions.

Fortunately, however, the percentages of larvæ which reach maturity is exceedingly small, the majority being destroyed by predaceous insects and other natural enemies.

American entomologists have lately recognised the importance of trapping as a means of controlling the Stable Fly (*Stomoxys calcitrans*) —a blood-sucking insect that carries a number of diseases of live stock and man—and have found the plan very successful. A trap made for this purpose, and designed to fit into the window opening of a stable, picked up about 5 quarts of flies in four months, no bait being used in the experiment, and when baited it caught no less than 37½ quarts of flies in a week.

We must not, of course, suppose that such convincing results would be obtained from a trap placed in a less favourable position, but the facts, nevertheless, are significant, and illustrate the possibilities ahead of future experimentation in this direction.

Now, blow-flies and other allied diptera are readily attracted by the smell of decaying animal or vegetable matter, so that it should be comparatively easy to induce the former to enter traps suitably baited.

A simple trap of this kind can be manufactured with little trouble out of a kerosene case and a piece of wire gauze, the latter being fixed to a movable light framework of wood, so that dead flies can be easily emptied out.

Unlike the American form already mentioned, it would need to be specially constructed for use on sheep runs, and, in the absence of window light, its efficiency would necessarily depend mainly on the attractiveness of the bait.

We cannot, however, hope to obtain satisfactory results from this method until stockowners come to realise that it would pay to subdivide their paddocks. In this connection it is interesting to find that the well-known Sheep Expert, Mr. W. G. Brown, writing in the "Queensland Agricultural Journal" last April, states—"Another important point in successful sheep farming is division and subdivision of paddocks. A 10-acre paddock is not too small. It is certain that a paddock of 100 acres will give poorer returns than four paddocks of 25 acres each.

"The advantages are—Total consumption of all herbage, which may include even Bathurst burr, if not too old, and less likelihood of the feed being trodden down and soured if sheep are run in small paddocks.

"Sheep may be changed oftener, and they are very fond of a change of pasture, if the new one be bare. Fodder is allowed in larger paddocks to grow too long and rank. The sharp toes destroy more than is eaten if the sheep are left too long in a fallow, as must happen in a big paddock.

"In small paddocks, sheep become quieter, and consequently do better."

Another advantage that would result from such subdivision is that the chances of serious loss from attacks of insect pests would be reduced to a minimum. The impracticability of trapping flies on a 20,000-acre paddock is obvious; but conditions should be very different on small holdings, where sheep are more under control, and the blow-flies that may be attracted to them are just as likely to fly to the baited traps.

Before attempting this method of control, it is imperative that all dead sheep, rabbits, &c., or decaying animal matter of any kind should be burnt or otherwise destroyed, as such substances left to rot not only afford congenial breeding places for larvæ of the pest, but provide counter attraction for large numbers of the adult flies.

I am inclined to believe that the present trouble may be largely due to our past neglect of these precautionary measures.

It is only reasonable to suppose that an abundant food supply of this kind would, if maintained long enough, enable the insect to multiply excessively, and, in the event of such conditions becoming reversed, that these vast swarms of flies would sooner or later be obliged to acquire new tastes. Even under normal conditions, some kinds of blow-flies will, if unable to locate animal matter, deposit eggs or larvæ on other substances. Apparently the natural odour of sheep's wool has always been more or less attractive to them, for at certain times of the year our common species (*Calliphora villosa*) will blow blankets.

I have also known it to deposit larvæ on freshly-cooked potatoes and rice, and occasionally on bread. The selection of such vegetable foods, however, is probably a matter of compulsion rather than choice, and generally signifies that the fly has carried its eggs until hatched into maggots, which are a menace to its own safety and have to be ejected as soon as possible.

With regard to the practical side of the question, and the best mode of applying this method of trapping, I would suggest that at least 10 traps be used on paddocks containing 100 acres.

This number should afford a satisfactory measure of protection, and hardly fail to do good work. It would be advisable to place each on a rough platform (a slab would do), fixed to a stout pole driven into the ground, the pole being sufficiently high to prevent sheep from reaching the trap, and give the breeze a chance to become charged with odour of the decaying bait.

Choice of position for these traps would depend to some extent on the nature of conditions obtaining in the field, some of which are known to affect the habits of such flies very materially.

This interesting question, however, awaits fuller investigation, but is, I think, one that presents possibilities that may prove important, and perhaps help us in the solution of this difficult problem.

ATTAR OF ROSES.

This delicious perfume is principally obtained from Bulgaria, and (says "Harper's Weekly"):—

"One of the incidental consequences of the conflict in the Balkans is the rise in the price of perfumery. Of attar of roses Bulgaria is said to have practically the monopoly. Various attempts have been made to create a rival product both in the chemical laboratory and in other soil than that of Central Europe; but Australia is the sole quarter that offers any promise, while the material which the Bulgarians extract from the roses remains superior to all others. These Balkan mountain roses grow in great abundance, and when cultivated yield marvellous amounts of the extract."

Mr. C. Ross, Instructor in Fruit Culture, describes the rose from which the scent is obtained as a four-petalled, white and vari-coloured rambler flower, much like the dog rose. Whether the light labour of getting the flowers could be profitably performed in Australia, considering the present high rate of wages, is problematical; but, at all events, it would appear from the above that Australia is the only country of all others in which the particular rose yielding abundance of scent could be successfully grown. In August, 1908, we described in this journal the method of obtaining the perfume on a small scale as follows:—

Gather a quart of rose leaves from fragrant roses after the dew is all off. Do not pick them soon after rain, as they are not so fragrant then. Put a layer of the leaves at the bottom of a wide-mouthed glass bottle, sprinkle with salt, and then cover with a layer of absorbent cotton made wet with pure olive oil; add another thick layer of rose leaves, sprinkled with salt, and fill the bottle with alternate layers until the bottle is full. Tie a piece of oiled silk (double) over the top of the bottle; set it where the sun will shine on it all day for two weeks; then uncover, and extract the oil from the cotton and rose leaves. This method yields a perfume superior to most which are sold.

Vegetable Pathology.

PRICKLY PEAR AS A STOCK FOOD.

Mr. E. A. Smith, Inspector of Stock at Mungindi, writes:—In the article "Vegetable Pathology," by Messrs. Brünnich and Smith, I notice that it is said that prickly-pear leaves could be utilised as a stock food. I may tell you that when I was Crown Lands Ranger at Taroom, I was inspecting a selection, where I saw a number of pigs running loose. On reaching the selector's (a German) house, I saw in the yard a large boiler, and inquired what was in it. The selector informed me that he boiled the pear for the pigs, and they did well on it. I found out that he fattened by this means a large number, and then drove them down to Miles Railway Station. I think pigs would take to this diet better than cows, though it is well known that cattle are very fond of the green shoots and devour them greedily. I noticed, in a fat-bullock paddock on a station near Taroom, that the leaves of the scattered pear were all bitten half off. There is no doubt that in time of drought cattle will live and fatten on the pear—that is, not on the long spiked variety, but the other. If you want any further information on the subject, I should be glad to give it you, as I was nearly two years among the pear districts, inspecting selections and so on.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·16	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·31	5·0	6·39	5·4	6·30	5·19
3	6·14	5·15	6 31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6 32	5·0	6 39	5·4	6·29	5·20
5	6·15	5 13	6·32	5·0	6·39	5·5	6 28	5·20
6	6·16	5·13	6·33	5·0	6·39	5·5	6·27	5·21
7	6·16	5 12	6 33	5 0	6·39	5·6	6·26	5 21
8	6·17	5·11	6·33	4·59	6 39	5·6	6 26	5·22
9	6·18	5·10	6·34	4·59	6 39	5·7	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6 23	5·23
12	6·19	5·8	6·35	4·59	6·38	5·8	6·22	5·24
13	6·20	5·8	6 35	4·59	6 38	5·8	6 22	5·24
14	6 20	5·7	6 36	4·59	6·38	5·9	6 21	5·25
15	6 21	5·7	6·36	5·0	6·38	5 9	6·20	5 25
16	6·22	5·6	6·37	5·0	6·37	5·10	6·19	5·26
17	6·22	5 6	6 37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6·37	5·0	6 37	5·11	6·17	5 27
19	6·23	5 5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6 37	5·0	6·36	5·12	6 15	5·28
21	6·25	5·4	6·38	5 0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·0	6·36	5·13	6·13	5·29
23	6·26	5·3	6·38	5·1	6·35	5·13	6·12	5·30
24	6 26	5·3	6·38	5·1	6 35	5·14	6·11	5·31
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5 31
26	6·27	5·2	6·39	5·1	6 34	5 15	6 9	5·31
27	6 28	5·2	6·39	5·2	6 33	5·15	6·8	5·32
28	6·28	5·1	6 39	5 2	6·33	5·16	6·7	5 32
29	6 29	5·1	6·39	5·2	6 32	5·16	6·6	5·32
30	6·29	5·1	6 39	5·3	6·32	5·17	6·5	5·33
31	6 30	5·0	...	...	6·31	5·17	6·4	5 33

PHASES OF THE MOON.

			H. M.
6 May	🌑	New Moon	6 24 p.m.
13 ,,	☾	First Quarter	9 45 ,,
20 ,,	○	Full Moon	5 18 ,,
28 ,,	☽	Last Quarter	10 14 a.m.
5 June	🌑	New Moon	5 57 a.m.
12 ,,	☾	First Quarter	2 37 ,,
19 ,,	○	Full Moon	3 54 ,,
27 ,,	☽	Last Quarter	3 41 ,,
4 July	🌑	New Moon	3 6 p.m.
11 ,,	☾	First Quarter	7 37 a.m.
18 ,,	○	Full Moon	4 6 p.m.
26 ,,	☽	Last Quarter	7 59 ,,
2 Aug.	🌑	New Moon	10 58 p.m.
9 ,,	☾	First Quarter	2 3 ,,
17 ,,	○	Full Moon	6 27 a.m.
25 ,,	☽	Last Quarter	10 18 ,,

Irrigation.

CONVOLUTED TUBE WELLS FOR IRRIGATION.

BY T. A. MILLER BROWNLIE, C.E., Engineer Amritsar Municipality.

(*From the "Agricultural Journal of India."*)

Considerable difficulty is experienced in many parts of the country in obtaining a sufficient supply of water from wells for the necessary irrigation of the fields in their immediate vicinity.

Most people are aware that only a limited quantity of water can be taken from any well; this limited quantity, which is the safe yield of the well, represents a maximum velocity of water passing through the subsoil (sand, gravel, &c.) which forms the well floor, without disturbing the arrangement of the finest particles forming the flooring.

The velocity at which this disturbance commences is known as the "critical velocity," and this varies with different qualities of subsoil. For instance, in a well sunk in gravel the water passes through this material at a comparatively high velocity before the smallest pebbles are displaced, whereas in a well sunk in sand the critical velocity is much lower, the finest particles of that material being more readily displaced than small pebbles.

Water may be withdrawn from any well for an indefinite period without damage to the well, provided the critical velocity is not exceeded, but if the rate of withdrawal of the water exceeds the critical velocity the effect is as follows:—The finest particles of sand at and near the surface of the floor of the well are the first to be displaced; these will be in partial or full suspension, according to the velocity of the water; fine particles from the layer below the surface will travel upwards to replace the voids left by the particles from the surface layer, and these in turn will be carried into the well. This action extends below the level of the bottom of the walls or curb of the well and also extends laterally; the fine particles flow in from under the walls, the density of the subsoil is being altered, the spaces between the particles of sand increased.

The disturbance of the subsoil is within a roughly shaped plano-convex figure, on the plane surface of which the well rests, and the superficial area of the whole figure (excluding the well area) is such that the water passes through this surface at the critical velocity for the subsoil.

What, then, is the result of exceeding the critical velocity of a well? (*a*) The finest material is washed into the well and forms a new floor in the well above the level of the old floor—*i.e.*, silting occurs. (*b*) The subsoil under the well is loosened, and the well tends to sink and is liable to collapse.

The principle of exceeding the critical velocity in wells is adopted for sinking wells for foundation work, powerful pumps being used to pump out the sand, gravel, &c., which flow into the well, thus loosening the foundation, into which the well sinks by gravity.

Various expedients have been tried in order to increase the yield of wells beyond their critical velocity. One of these is to fill in the floor of the well to a certain depth with gravel of various sizes, arranged somewhat in the manner of a percolation filter, but in reverse order; this has not proved satisfactory, as after a short time the wells again become silted, by sand, &c., being carried up through the interstices of the stones. Exactly the same feature is observed in ordinary water filters when worked too rapidly. Where sand of varying grades of coarseness forms the floor surface of wells, it has been found that the fine particles are disturbed at velocities of 2½ ft. to 3 ft. per hour—*i.e.*, the critical velocity.

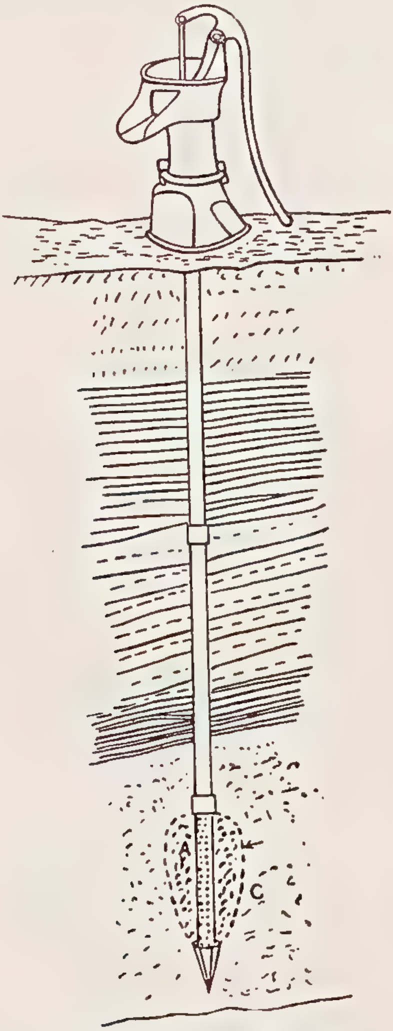
Another method is to cover the floor of the well with a fine straining material, and this also has proved unsatisfactory on account of the finest particles of the subsoil being washed through the strainer and silting on its upper surface, while at the same time the coarser particles pack on the under side of the strainer, thereby reducing the flow until the yield ultimately falls again to the critical velocity.

Experiments on the yield of ordinary wells have been carried out for over 30 years by various engineers in many parts of the world, and the conclusions drawn from these are that it is unsafe to withdraw water, for any length of time, at a rate exceeding the critical velocity of the subsoil of the well. The critical velocity in sand of varying degrees of fineness has been found to be between 2½ and 3 ft. per hour; and even in coarse sand of fairly uniform grain, only a very slight increase in this critical velocity has been observed. The critical velocity in various qualities of sand being within comparatively narrow limits, and loading and screening of the floors of the wells having little effect on their velocity, the question arose—Why is it possible to extract a much larger quantity of water per unit time and area from the Abyssinian and American forms of tube wells than from ordinary wells in the same subsoil?

The writer has been investigating this subject for twelve years, and experiments carried out with tube wells of various forms in several conditions of subsoil, natural and artificial, have resulted in the conclusion that water may be withdrawn constantly from these tubes at a rate which represents a velocity through the waterway area of the strainer of forty to sixty times the critical velocity of the subsoil—that is to say, if an ordinary well with floor area of 1 unit discharges 1 unit of water per minute under a head of 6 ft. without exceeding its critical velocity, or, say, half a unit of water per minute when under a head of 4 ft., then a tube well in the same soil and having a straining waterway area of 1 unit, will deliver, when under the same head of 6 ft., from 40 to 60 units of water per minute, or from 20 to 30 units per minute when under a head of 4 ft.

For the purpose of illustrating the reasons for this, the Abyssinian tube well may be taken. This consists of about 20 ft. of pipe, say, 1½ in. diameter; one end of this pipe is perforated, for a length of a few feet, with a number of small holes about ⅜ in. diameter; over this perforated portion of a pipe a straining material, usually fine wire gauze,

is secured, and over the gauze, in order to protect it from damage, a piece of perforated sheet metal is secured. The perforated end of the pipe is closed, and provided with a metal point for driving into the ground. The whole length of tube is driven vertically into the ground,



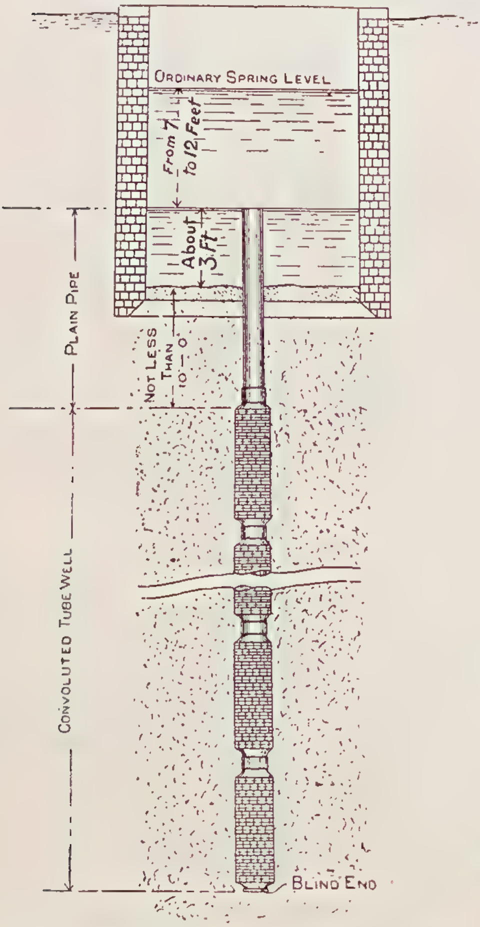
ABYSSINIAN TUBE WELL.
A—"cavity" consisting of coarse particles of sand surrounded by C—unaltered sand.

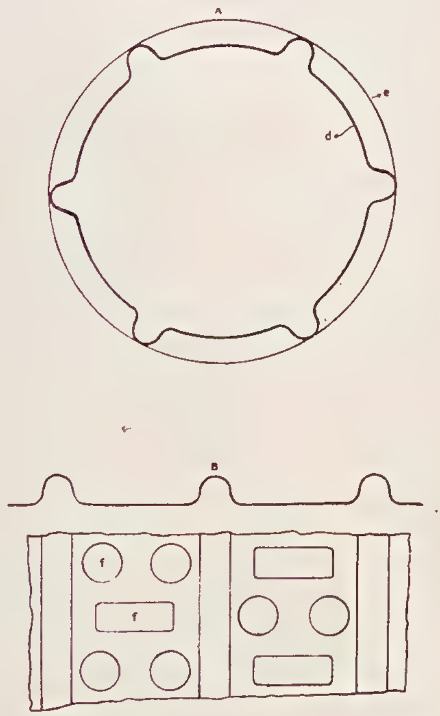
leaving only 1 ft. or so above ground level; a hand pump is attached to the portion of pipe projecting above ground. This form of tube is of course only suitable for low lifts—*i.e.*, when the water level is about 18 ft. from the ground surface.

On working the pump, a mixture of sand and water is discharged, and pumping is continued until the water comes away free from sand, and thereafter a constant supply of clear water may be obtained.

Now what has happened round the strainer or perforated portion of the tube is that the fine particles of sand have been washed through the straining material into the tube, and, the tube being of small bore in comparison to the quantity of water passing through it, the velocity

up the tube to the pump is sufficient to carry the sand with it, keeping the inside of the tube and strainer free from silting. The subsoil surrounding the strainer portion of the tube has become freed of its finer particles, and therefore has a higher porosity than the undisturbed subsoil; this freeing of the subsoil surrounding the strainer takes place within a pear-shaped figure, the strainer tube being the axis; the surface





A.—Cross section of convoluted tube well; (*d*) body of tube; (*e*) straining material.
B.—Piece of convoluted sheet before forming into tube; (*f*) perforations in sheet.

area of the figure is such that the water passing through this surface has a velocity not exceeding the critical velocity for the subsoil. Therefore, surrounding the strainer we have what is usually called the "cavity," which is only a cavity in the sense that it is freed from the smaller particles of sand and contains the coarser material loosely packed. The writer's experiments have shown that this coarse material arranges itself around the strainer according to size of grain, the largest being next to the strainer, then the second largest, and so on to what might be called the critical velocity limit, where the disturbed merges into the undisturbed subsoil.

These Abyssinian tube wells give comparatively small discharges, and, owing to their construction, do not last any great length of time, but are extremely useful for domestic supplies and are inexpensive to repair. The fact that the straining material is in contact with the perforated portion of the tube reduces the waterway area of these

perforations by the amount of wire in contact with the perforations; this represents quite three-fourths of the area thus rendered ineffective.

The convoluted tube well, which is designed for large discharges, differs from the many forms of tube wells on the market in so much that it is the only tube well which has the waterway area of the straining material equal to the waterway area of the perforations. The tubes are made from sheet steel, specially shaped to obtain this result, which prevents any change of velocity between the straining material and the body of the tube and thereby reduces friction and loss of head to a minimum.

The straining material is composed of heavy copper wires lying parallel and woven with copper ribbons; this arrangement forms a substantial and lasting material combined with a maximum of fine slots for the percolation of water.

Convoluted tube wells are manufactured in various sizes for discharges ranging from 5,000 to 45,000 gallons per hour.

The method of sinking and working the tube wells is as follows:—If the tube is required to augment the supply of water to an existing well and the desired quantity of water from the tube well has been decided upon, a tube well estimated to yield the nearest quantity above the required amount should be selected. Now assume that the tube selected is 40 ft. in length; then a bore tube of a few inches larger diameter than the diameter of the tube well should be sunk in the well to a depth of not less than 50 ft. below the bottom of the well. The tube well is lowered into the bore tube, and sufficient plain pipe is added to the tube well to bring the upper end of the plain pipe not less than 7 ft. below the normal spring level in the well; the bore tube may now be withdrawn, and the tube well is ready for use. So long as the water in the well is not lowered more than would exceed the critical velocity for the material forming the well floor, there is no need to cement or otherwise seal the well floor; the tube well will yield its supply in addition to the yield of the well.

In cases where the yield of the well is small, due to a small well, to the floor of the well being in a bad water-bearing stratum, or to other causes, it is advisable to seal the well floor with cement concrete; the water level in the well may then, if desired, be reduced below that level which would represent the critical velocity for the material forming the well floor, but this lowering should not be carried to excess, or, in other words, very little more water than the amount the tube is designed to discharge should ever be pumped from these tube wells. Overpumping causes the coarse particles, which are too large to pass through the straining material, to pack against the strainer, thereby reducing the porosity of the material surrounding the strainer; and the discharge from the tube well is consequently reduced.

Convoluted tube wells may be sunk direct into the ground, and worked by attaching the pump to the upper end of the plain tube; the plain tube then becomes the suction pipe of the pump. This arrangement is particularly convenient where spring level is within the suction action of pumps worked on ground level. Considerable care should be

exercised in fixing the pump level relatively to water level, as various forms of pumps differ very considerably in efficiency on different suction lifts; generally the suction should be as short as possible.

In situations where the spring level is at a depth below ground surface too great for the suction action of a pump worked on ground surface, the pump may be placed in a chamber below ground level and within convenient suction distance of the reduced water level. For this reason it is often convenient to sink these small tube wells in old wells, which provide space for the pumps, or the small tubes may then be worked by Persian wheels or chain pumps.

Where the water level is very considerably below ground level, the Ashley tube well pump should be employed, and, in order to obtain the full discharge of the tube well, the plain tube should be of larger diameter than the straining tube.

The Ashley pump can be worked with safety in this tube to depths of several hundreds of feet below ground surface. In single pumping plants of this type, a water compensating balance relieves the weight of the pump rods; in the duplex sets, the rods of one set are balanced by the rods of the other set.

Tube wells which are worked by the Ashley pump should be carefully shrouded to prevent powdery sand from reaching the valves; shrouding is an advantage also in very fine sand or other low porosity subsoil.

Convoluted tube wells are manufactured for India by the Empire Engineering Company, Cawnpore, and are stocked with a standard gauge of straining material which is suitable for most places, but it is advantageous to submit geological sections and samples of the strata met with, in order to obtain the tube best fitted to the conditions under which it has to work.

The smallest stock size of convoluted tube well, 3½ in. diameter, will generally be found sufficient for increasing the water supply in wells in which Persian wheels or other forms of animal-power water lifts are employed. These tubes are capable of delivering up to 5,000 gallons per hour, cost Rs. 272, and can be sunk and made ready for use for a further expenditure of, roughly, Rs. 200, or under Rs. 500 in all. This sum is approximately one-eighth of the cost of ordinary wells of equal capacity, and in the larger sizes the difference between the cost of tube wells and wells of equal capacity is much more marked.

There are already many convoluted tube wells working in the Punjab both for public water supplies and for irrigation purposes. One case in particular is worth mentioning. A well of 10 ft. diameter was sunk over thirty years ago, with the intention of installing a Persian wheel for irrigation purposes; unfortunately, the subsoil was a mixture of running sand and clay; a single-bullock Persian wheel dried the well in half an hour, and recuperation took so long that the Persian wheel was dismantled and the well abandoned after a sum of over Rs. 2,500 had been spent on it. The writer installed a 3½-in. convoluted tube well, and now 100 gallons per minute or 6,000 gallons per hour are being drawn from the well for irrigation purposes.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order LEGUMINOSAE.

STYLOSANTHES, Sw.

Calyx with an elongated filiform tube and scarious lobes, the four upper ones connate, the lowest distinct. Petals and stamens inserted at the throat of the tube; standard orbicular; wings oblong free, keel incurved, subrostrate. Stamens all connate in a closed tube; the anthers alternately longer and fixed near the base, and shorter and versatile. Ovary nearly sessile at the base of the tube, 2-3 ovulate. Style long, filiform, after flowering broken at the middle or near the base, the portion that remains becoming decurved; stigma minute terminal. Pod subsessile, compressed, crowned with the persistent curved base of the style, the articulations two, sometimes solitary, rugose-reticulate. Perennial (often viscous) herbs or undershrubs. Leaves pinnately trifoliate. A tropical genus, principally Brazilian.

S. mucronata, *Willd. sp. Pl.* 166 (Pl. 99). A copiously branching undershrub with stems not more than a foot long, the branches clothed with short grey pubescence. Stipules scarious, finely bristly on the back, adnate. Leaflets 4-6 lines long, 2 lines broad, narrowed to both ends, the point mucronate, texture rigid, veins prominent, under-surface finely pubescent. Flowers in dense terminal rounded heads. Bracts rather short, finely pubescent on the back, and sometimes bristle-ciliated. Calyx 2 lines deep, the plumose rudimentary floret rather longer. Pod with 2 articulations, about ¼ in. long, both the faces and style pubescent.

Hab.: Common now in many tropical countries and of late has been met with as a weed round about Townsville, especially troublesome in lawns, *E. W. Bick.* (June, 1913.)

Order DROSERACEAE.

DROSERA, Linn.

D. indica, *Linn.*, **forma robusta,** *Bail. n. form.* (Plate 100). Whole plant of a more than usual robust growth; leaves straight except at the immediate end.

Hab.: Mill Stream Falls, Ravenshoe, *E. W. Bick.* (June, 1913.)

Order FILICES.

POLYPODIUM, Linn.

P. serpens, *Forst.*, **var. grande,** *Bail. n. var.* (Plate 101). The plants to hand of this new variety have a much larger, more robust growth and larger sori than the common form.

Hab.: Atherton and Kairi, *E. W. Bick.* (June, 1913.)

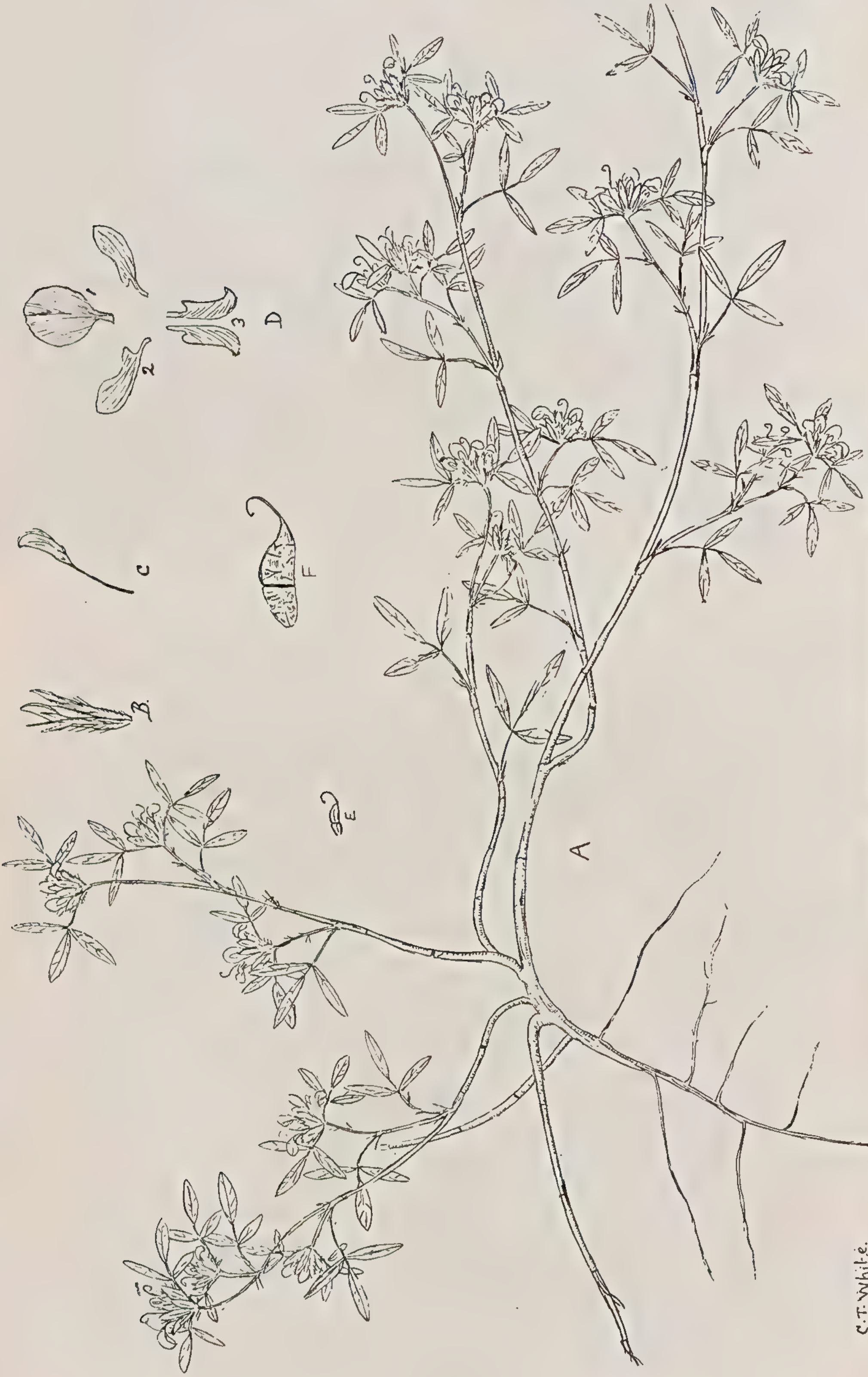


PLATE 99.—STYLOSANTHES MUCRONATA, *Willd.*

(A) Plant slightly reduced, (B) flower and bracts, (C) flower, (D) corolla. (1) Standard, (2) wings, (3) keel. (E) and (F) Pod; (B), (C), (D), and (F) enlarged; (E) nat. size.

Plate 100.—Drosera indica, *Linn. forma* robusta, *Bail. n. form.*

PLATE 101.—POLYPODIUM SERPENS, *Forst.* VAR. GRANDE, *Bail. n. var.*

BRISBANE BOTANIC GARDEN NOTES.

By J. F. BAILEY, Director.

PALMS (*continued from page 406.*)

(With Plates.)

Latania Loddigesii is a Mauritius palm with a large palmate plaited leaf. There is only one specimen in the Gardens, and this a female plant, which flowers each year.

Plate 102.—Latania loddigesii.

Several species of Sabal are represented here, the handsomest being *S. Blackburniana,* the Bermuda Palm, its large fan-shaped leaves being recurved in a graceful manner. The leaves of this and *S. mauritiformis,* the Savannah Palm, which is also growing in the gardens, are used in

PLATE 103.—SABAL BLACKBURNIANA.

the manufacture of baskets, hats, &c. *S. Adansoni* is a low-growing palm, the stem for the most part being underground. The soft interior of this latter species is eaten in the Southern States of America. All the species here represented fruit with us—some of them abundantly.

Chamærops humilis is a small, neat growing palm with erect fan-shaped leaves, and is the only species of the order represented in the

European indigenous flora. It is usually a dwarf grower forming a mass of suckers, but occasionally sends up a stem several feet high. The leaves are used for making hats, baskets, and brooms. They also yield fibre, which the French manufacture into a material resembling

PLATE 104.—CHAMÆROPS HUMILIS.

horsehair, for which it is often substituted. The coarse fibre from the bases of the leaves is said to be used by the Arabs for mixing with camel's hair to make tent covers. Like most palms, the young and tender crown of the plant is edible. Our plants flower freely, but seldom produce fruit. There are also growing in the Gardens the varieties *tomentosa* and *elegans*.

Washingtonia filifera, the Californian Fan Palm—or, as it is sometimes termed, the Cotton Palm, on account of the margins of the segments of the large circular leaves breaking up into threads, hence the specific name *filifera*—is represented by several handsome specimens. The seeds, none of which, however, have been borne on our plants,

PLATE 105.—WASHINGTONIA FILIFERA.

germinate quickly, and the plants grow rapidly. It does not seem to be particular as to soil—in fact, in its native habitat it grows in rocky localities in dry sheltered cañons. This palm will grow in the cooler parts of the State. Synonyms: *Brahea filamentosa, Pritchardia filamentosa,* and *P. filifiera.*

General Notes.

THE TABLEIDI TREE OF KORDOFAN.

Kordofan is an extensive district in the Egyptian Sudan, on the west of the White Nile, and is the most easterly of the Sudan States, noted as the scene of the Mahdi rising in 1884. In this country, we learn from a letter received by the Under Secretary, Department of Agriculture and Stock, from Mr. H. M. K. Berridge, Drillham, there are said to be some extraordinary trees, which are described as natural water tanks in an extract from a letter forwarded to Mr. Berridge by Mr. W. J. Lowe, Wimbledon, London. The extracts read as follows:—In Kordofan there are several peculiarities, which God, in his mercy, has caused to grow just in that part of the world. These wonderful Tableïdi trees are hollowed out, beginning from the top, and, during the rainy season, they get filled up with water which lasts through the long, hot summer, and remains good and sweet till the next fall of rain. In the summer time these trees are sold as they stand, full of water, for a little over £5 sterling. I have heard that some of them attain to a circumference of no less than 30 yards. The Government has ordered more of them to be planted. These valuable trees also bear a fruit of the size of an apple which is used to make a bitter water more fit for drinking.

An official report states that the natives of Dar Hamar now own as many as 36,000 Tableidi trees, of which more than 30,000 are in good condition for retaining water. The rest are more or less dilapidated, and have been repaired with cement. Cases of litigation used to occur concerning the ownership of these trees, but they have now been registered in the names of the proprietors, like land or house property.

We have consulted Mr. F. M. Bailey, Colonial Botanist, about these trees, and he can find no record of them in his botanical library. Perhaps, if Mr. Lowe had given the botanical name for them, they could have been identified.

We have also carefully looked through the history of the war in the Soudan, but find no mention of them either in Lord Wolseley's records or in those of General Gordon, both of whom would certainly have an accurate knowledge of the extraneous supplies of water apart from rivers and wells, and especially of such remarkable trees as those mentioned. British troops were well acquainted with the country west of Khartoum and Fashoda, but in no case have we found mention of such trees, and, singular to say, maps of the Upper Nile and the Sudan do not indicate the locality of Dar Hamar, all Dar districts being located

in Darfur within 600 miles of the White Nile on the west, with the exception of Dar Sennar and Dar el Funki, which lie between the Blue and the White Nile, at the junction of which are Khartoum and Omdurman.

Since writing the above, we began to think that possibly the Baobab tree of Africa was in question, and, from what we know of that tree, the description of the Tableidi tree of Kordofan applies in every particular to the former.

The African Baobab or " Monkey Bread " tree may justly be called the " Elephant" of the vegetable world. It has been described by many African travellers. Near Guma, in Fassokl, in Eastern Turkestan, there is a Baobob tree 30 ft. in diameter and 95 ft. in circumference; and near the mouths of the Senegal River, in Western Sudan, such trees are found having a circumference of over 100 ft. All these giants are hollow, like ancient English willow trees. The hollow space fills with water during the rainy season as described by Mr. Lowe, and thus the tree becomes a cistern, the water from which is sold to travellers by the natives. In Kordofan the Arabs climb the tree and lower buckets into the water. In the Congo district of Central West Africa the natives are more ingenious, as they bore a hole in the trunk and put in a plug or tap.

The height of the Baobob seldom exceeds 60 ft., acquiring that height and a diameter of 3 or 4 ft. in 30 years, when it continues only to increase in diameter. The oval fruits are about the size of a large cucumber, the white flesh of which covers a number of brown seeds, and is of an agreeable flavour. Being much relished by monkeys, the name " Monkey Bread tree" was given to it.

As to their age, a Baobab probably lives to over 5,000 years, as there is one tree in Africa in which it is authentically stated that a Roman Consul dined with 25 other persons. That tree has been examined by arboriculturists, and is set down as having begun its life in the 8th century.

It would seem that the Baobab is not the only tree which can thrive with a hollow trunk, for there is a Camphor tree at Sorrogi, in Japan, whose hollow trunk can hold 15 people, and is probably as old as the Baobab abovementioned.

PRESERVED KUMQUATS.

Prick fruit with darning needle, and boil gently in plenty of water till quite tender; strain water off, and add syrup which has been previously made of 1¼ lb. sugar and ½ pint water to every pound of fruit (which should be weighed before boiling). Boil syrup 20 minutes. Add fruit to syrup, and boil all for 10 minutes.

MUMMY WHEAT.

All attempts to induce growth from wheat grains discovered in the tombs of Egyptian mummies have failed. Recent researches suggest that, while the power of germination in wheat or barley is little affected for five years, after that period a rapid loss of vitality sets in. Considerable chemical change was noticeable in the mummy wheat, which is probably about 3,400 years old. It had lost 2 per cent. of its moisture, and with that its vitality. The following extract on the subject from "Knowledge" is interesting:—"When crushed the flour was very irritating to the nostrils, and smelt strongly of bitumen—the preservative used to embalm the mummy. It was also markedly acid. Examined under the microscope its particles differed entirely from those of modern wheat. When treated with water it gave a thin paste without any strength of dough."—"Pastoralists' Review."

PRICKLY PEAR.

Mr. J. Rasmussen, who recently arrived in Australia from America (says the "Pastoralists' Review"), apparently sees no difficulty in the way of getting rid of the prickly pear pest. He proposes to cut it by machinery, and utilise it for various purposes. He stated that in Honolulu, Arizona, and Mexico the prickly pear is abundant, and is used after treatment for the nourishment of man and beast, and also in the manufacture of liqueurs. He saw enough to convince him that it was an easy matter to clear it off the land. The cactus itself could be used in the manufacture of pulp for paper, leather boards, and other purposes. He had visited the Burbank experimental farms, and had seen the spineless cactus, and advocated its introduction into the dry regions of Australia. From root to tip the cactus was practically all food and drink, and was greatly relished by all herbivorous animals, as well as poultry. In some parts the cattle and horses never drank water at all, getting all they needed from the cactus, which contained about 80 per cent. of fluid. Animals fed entirely on it improved in condition in quite a wonderful manner. There were vast possibilities for the unused lands in the interior, where there was not sufficient grass or water to maintain stock. The cactus would supply both needs. The ordinary prickly pear was not to be despised as a tasty preserve, and he claimed that more sugar could be extracted from it than from sugar-cane, and that the product was of equally good quality.

TO MAKE HOP BEER.

Ten gallons water; 2 quarts maize or wheat; 10 cups of sugar; 2 handfuls of hops; 1 or 2 rhizomes of ginger bruised; and a few chillies, according to taste.

Boil the maize or wheat for 2 hours in a kerosene tin of water. Boil the sugar, ginger, chillies, and hops for 20 minutes in an enamelled pan. Strain all through fine cloth into a 10-gallon keg. Wash all the strainings left on the cloth with tepid water in a separate vessel, strain off the liquor, and pour it into the cask. Next day fill the cask up with liquor or water, allowing the scum to float away. Then bung tightly.

DESTROYING STUMPS WITH CHEMICALS.

Persons unaccustomed to handling certain chemicals are warned not to follow the directions given in this journal for destroying stumps by the use of a mixture of nitric and sulphuric acid. One of these requires to be added very slowly to the other. If they are rapidly mixed there is danger of injury to the operator. In the same way, when one acid is poured into the hole made in a stump, and the other is added quickly and the hole at once plugged, the violent reaction of the acids may blow out the plug, part of the acid may follow, and there is danger that the operator's hands may be severely burnt, or even that he may be struck in the face by the plug, or have his eyesight injured by the acid.

BANANA JUICE AS A CURE FOR SNAKE-BITE.

A correspondent has forwarded us the accompanying extract from "The Over-Seas Daily Mail," indicating a remedy for snake-bite which is simplicity itself, and one within the reach of all living and working on our coast lands. Whatever may be the properties of the juice of the stem of the banana plant, it would seem from the newspaper extract that it has something in its composition which destroys the snake-poison. The alleged cures are certified by Mr. W. N. Weston, a resident of Matto Grosso, Brazil, as follows:—

I have witnessed some remarkable cures of bites from poisonous snakes while on a trip in the district of the Rio Taquary. One of these was an Indian peon, who was bitten in the foot by a "Yaraoca" snake. He arrived at the Estancia, apparently in the final stages, bleeding from the gums and all swollen up. A drink of banana juice taken from the *tree trunk* was given him, and in three days he was quite sound.

Another case was that of a child who was treated in the same way and recovered. I also saw the case of a bullock which was snake-bitten and seemed to be dying, unable to get up. We made an experiment by forcing it to swallow the juice. The swelling subsided, and next day the bullock was almost sound and able tograze.

There is no doubt it is a wonderful remedy, and I would be interested to know if any of your readers have heard of it and could tell me what properties the juice contains.

Answers to Correspondents.

PROTECTING FRUIT TREES FROM WHITE ANTS.

J. MOORE, Sellheim—

Apterite is destructive to most insect life when chipped into the ground, and is not harmful to plants. Sugar and arsenic spread between slips of pine wood, and covered with an inch of soil, is a good trap for white ants.

Bore a hole a few inches deep in the soil and pour into it a couple of ounces of bisulphide of carbon; then plug the hole. The fumes will destroy all the ants in the neighbourhood. If the carbon is to be exploded, the hole should be covered with a heavy cloth or bale. The gas. on the explosion, will permeate the soil and kill the ants.

"SUBSCRIBER," Childers—

See Notice referring to Anonymous Letters, under "Departmental Announcements."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1913.

Article.		JUNE. Prices.
Bacon, Pineapple	lb.	8d. to 9½d.
Bran	ton	£5 10s.
Butter	cwt.	126s.
Chaff, Mixed	ton	£4 10s.
Chaff, Oaten (Victorian)	"	£5 10s. to £5 15s.
Chaff, Lucerne	"	£4 5s. to £4 10s.
Chaff, Wheaten	"	£3 10s. to £4 10s.
Cheese	lb.	8d. to 8½d.
Flour	ton	£9
Hams		1s. 1½d.
Hay, Oaten (Victorian)	ton	£5 15s. to £6 15s.
Hay, Lucerne	"	£4 5s. to £4 10s.
Honey	lb.	3½d. to 3¾d.
Maize	bush.	3s. 3d. to 3s. 5d.
Oats	"	...
Onions	ton	£7 10s.
Pollard	"	£5 10s.
Potatoes	"	£7 to £10
Potatoes, Sweet	cwt.	2s. 6d. to 4s.
Pumpkins	ton	£2
Wheat, Milling	bush.	3s. 6d. to 3s. 8d.
Eggs	doz.	1s. to 1s. 2d.
Fowls	pair	2s. 6d. to 5s.
Geese	"	...
Ducks, English	"	3s. 3d.
Ducks, Muscovy	"	4s. to 5s. 6d.
Turkeys (Hens)	"	6s. 6d. to 7s. 9d.
Turkeys (Gobblers)	"	10s. to 16s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	13s. to 13s. 6d.
Bananas (Fiji), G.M., per bunch	2s. to 10s.
Mandarins (Queensland), per case	9s. to 12s. 6d.
Oranges (Queensland), per case	7s. to 8s.
Oranges (Queensland) Navel, per case	8s. 6d. to 13s.
Passion Fruit, per half-case	3s. to 9s.
Pineapples (Queensland), Queens, per case	5s. to 7s. 6d.
Pineapples (Queensland), Ripleys, per case	6s. to 7s.
Pineapples (Queensland), common, per case	4s. to 6s.
Tomatoes, per half-case	1s. 6d. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE. Prices.
Apples (Eating), per case	8s. 6d. to 9s. 6d.
Apples (Cooking), per case	6s. to 7s.
Apples (American) per case	7s. to 9s.
Bananas (Cavendish), per dozen	3d. to 5d.
Bananas (Sugar), per dozen	2d. to 3d.
Citrons, per cwt.	12s. to 13s.
Coconuts, per sack	...
Custard Apples, per case	4s. 6d. to 5s.
Grapes, per lb.	...
Lemons (Local), per case	3s. to 6s.
Lemons (Italian), per case	...
Limes, per case	4s. 6d. to 5s. 6d.
Mandarins, per case	4s. to 6s. 6d.
Mangoes, per case	...
Nectarines, per case	...
Oranges (other), per case	3s. 6d. to 4s. 6d.
Oranges (Navel), per case	4s. to 5s.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	4s. to 8s. 6d.
Peaches, per quarter-case	...
Peanuts, per lb.	3d.
Persimmons, per case	...
Pineapples (Ripley), per dozen	1s. 6d. to 2s.
Pineapples (Smooth), per dozen	2s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 2s.
Plums, per case	...
Rockmelons, per doz.	...
Strawberries, per dozen pints	4s. 6d. to 10s.
Tomatoes, per quarter-case	2s. to 4s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, JUNE, 1913.

Animal.	JUNE. Prices.
Bullocks	£8 to £10
Cows	£6 5s. to £7 10s.
Merino Wethers	32s. 3d.
Crossbred Wethers...	26s.
Comeback Wethers	31s. 6d.
Merino Ewes	18s. 3d.
Crossbred Ewes	22s. 3d.
Comeback Ewes	27s. 6d.
Lambs	22s.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated, uncleaned ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops and much future labour. Attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather; still, good showers may be looked for in October, and much useful work may be done during the present month which will afford a fair prospect of a good return for labour.

Plant out *Agave rigida* var. *sisalana* (sisal hemp plant) in rows 9 ft. by 9 ft., 8 ft. by 8 ft., or 6 ft. by 8 ft., apart, according to the richness of the soil. All dry places on the farm, too rocky or poor for ordinary crops, should be planted with this valuable aloe; especially should limestone country be selected for the purpose. If the soil is very poor and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. to 18 in. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch grass to grow round the roots. The sisal will do no good if planted in low, wet land, or on a purely sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sow cotton—Sea Island near the coast, and Upland generally; Caravonica succeeds best in Northern Queensland. Sow maize, sorghum, imphee, mazzagua, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre—the latter a bulb yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost; dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw or leaves or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile, and causes hard-pan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow cucumbers, melons, marrows, and squashes at

once. If they are troubled by the beetle, spray with Paris green or London purple. (*See* "Memorandum on Remedies for the Pumpkin Beetle," by Mr. H. Tryon, in this issue.) In cool districts peas and even some beetroot may be sown. Set out egg-plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Flower Garden.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature, and see that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, coleus. Roses will now be in full bloom. Keep them free from aphis, and cut off all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, galliardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. I can only repeat the advice I have often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruitgrower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blososm, thus securing a good set of fruit. Where irrigation is available, it is advisable

to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the pressure of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast district is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruitgrowers throughout Queensland during September and the two following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. SEPTEMBER, 1913. PART 3.

Agriculture.

MAIZE AT WARREN STATE FARM—*continued.*

The remaining six varieties of maize have now been harvested, with the following result:—

1. *Hickory King.*—A white variety, well adapted to poor soils, but will not yield heavily on good soils. I have noticed that this corn is one of the most reliable varieties in dry weather. It is characterised chiefly by its small number of rows, and its very large, broad grains. It has a smooth, flinty appearance.

The yield per acre this year was 26 bushels of first-class grain.

2. *Sydney Red.*—The same remarks apply to this maize as in the Annual Report of 1910-1911, viz.:—"This is a late maturing variety and a good maize for this locality. The stalks are strong and upright; the cobs nicely bent in the shanks, throwing the rain off well."

This variety was planted on a loose flat, with clay very near the surface. The ground was very wet when it should have been scarified; hence the crop was only once scarified, and that when about 3 ft. high. Rhodes Grass was planted between the rows. My idea at the time was to make the maize into silage, but the roads were too wet for carting at the proper time, and the crop was left for grain.

The yield per acre was 37 bushels 11 lb.*

* Nearly fifty years ago Sydney Red was a favourite corn for the Oxley scrub lands. The average yield was then 45 to 60 bushels per acre on virgin scrub soil. From the above it seems to be a most suitable variety for the Central Districts.—[Ed. Q.A.J.]

3. *Boone County, White.*—This (as the name implies) is a white corn. It has a large, cylindrical ear, with 18 to 22 rows. The grains are of a medium thickness and of medium width. The indentation varies from medium smooth to rough. It enjoys the rich soils, and is rather late in maturing. The stalks are strong and upright, and the cobs are better covered with husk than when first introduced to this farm in 1910.

The yield per acre this year was 60 bushels 2 lb.

4. *Horse Tooth.*—The seed of this variety was procured from Mr. Flewell Smith, of Kingaroy, and has only been planted here for one season, and I cannot as yet tell whether it will grow well on this farm, but, judging from this year's crop, I do not think that it will thrive here unless we give it a liberal amount of manure. I would rather see this giant grain planted in some of our rich scrub lands. I shall give it another trial and watch its habits.

The yield per acre was 42 bushels 5 lb.

5. *Leaming.*—This is the best variety we have yet tried on this farm, although it was not up to its usual standard this year owing to the wet weather, when it should have been scarified. I must say that the crop was far above expectations. The colour is a medium yellow, with a tinge of golden yellow, and the indentation varies from medium to medium rough. The grain is medium deep. The stalks are upright and strong, and the cobs well bent in the shanks.

I have no hesitation in saying that this is a good variety for this locality, in both scrub and open country, because I have seen it grown in both soils.

In 1910 it yielded 105 bushels 5 lb., but, owing to climatic conditions, it only yielded 56 bushels 6 lb. this year.

6. *Red Rib.*—Planted in the same class of land as Leaming, and treated in the same manner. A very small grain, all of different shapes and colours, and having no distinct type except that of dwarfy growth. This year was the first (and last) time for it to be planted here, as all I can say for it is, that it proved useless for either silage or grain.

EARLY CLOSING FOR STOCKMEN.

For some years it has been the custom for men employed in many trades to cease work on Saturday at 12 or 1 o'clock, supposing they do not get an "early closing" day in the middle of the week, but until recently the agricultural labourer has not agitated for a Saturday half-holiday. Now, however, this concession is asked for, and a proportion of large farmers are in favour of granting it; therefore it may not be out of place to consider the results of such a change while holding the opinion that the farm worker is entitled to as much consideration as a bricklayer's labourer or a navvy.

In the first place, it will be exceedingly difficult to give stockmen—such as milkers, shepherds, or ploughmen—their Saturday afternoon off,

unless cows are henceforth milked once a day and sheep are allowed to go from one morning to the next without being fed and tended, while a farmer who is all behind with his seeding or cultivations would scarcely like to see his teams lying idle on Saturday afternoon.

Then it happens that haymaking often lasts several weeks in this country, and it takes a full month to harvest the corn, during either of which it is hardly conceivable that the work of securing the hay or corn should cease at mid-day on Saturday, leaving a lot of "ready" hay or a field of corn exposed to the elements and to possible ruin.

It may, of course, be suggested that for all of these purposes the Saturday afternoon arrangement will be inoperative, but if that stipulation is made, the concession will not amount to much, and probably would not satisfy the up-to-date labourer.

As a matter of fact, the question bristles with difficulties from the farmer and stockowner's point of view, while a partial holiday granted to a few day men, which could not be granted to the most important men whom a farmer employs, would not be likely to work harmoniously. Of course, if hoers and men who are working by the piece choose to lose some of their time nobody can forbid them, but there are many operations connected with farming in which piecework is not possible. The change would press very heavily on small farmers, who have to work hard themselves in order to make a living, and such men want no further burdens than have already been imposed on them. A shortening of the working hours is quite as necessary to them as to the few people they employ, but how is it to be done? To large farmers with ample means, a large staff of men under working foremen, and all the devices obtainable for saving labour, doing a lot of work in a short time, the matter may not appear to have serious or far-reaching consequences, but to others a shorter week for their employees means a longer one for themselves or an increased wages bill.

There is no doubt that the successful British farmer is—and will be—the one who keeps the largest number of high-class stock; therefore the question of Saturday half-holidays is one which must be carefully considered, seeing that the stock must be attended to for seven days each week, and that by responsible men.

Of course, such work deserves good pay, and there are few stockowners who are not anxious to pay trustworthy men well, and to provide them with a good home. Moreover, it is probable that such men are proud of the animals they tend, and take a keen interest in them, and this is the spirit which should prevail among them if the live stock industry is to be carried on with success.—"Live Stock Journal."

EXHIBITS OF THE DEPARTMENT OF AGRICULTURE AND STOCK AT THE EXHIBITION AT BOWEN PARK, AUGUST, 1913.

Taking the Exhibit as a whole, it was full of interest, and that not only to agriculturists, orchardists, pastoralists, horticulturists, and generally to all primary producers, but also to scientists and to those who are now arriving from the Old Country, from the Southern States,

and from America and Canada, with the view of settling down amongst us as farmers and graziers, orchardists, vignerons, and market gardeners, or of investing capital in some of the many profitable industries which the acknowledged vast resources of the State present to them. And be it remembered that, as in the past, the then colony of Queensland was built up on the pastoral industry alone, to-day the State's future lies in the extension of agriculture and stock-breeding. It is with this conviction that the Department representing these two great industries is always seeking for and adopting the best means of carrying out the education of the community gaining a livelihood from the land far and wide throughout the State.

With the advent of population, and the closer settlement of the arable, pastoral, and mining lands of the State, the work of the Department of Agriculture and Stock has been more strenuous than in past times, and the constantly increasing demands on its resources have necessitated radical changes in the utilisation and application of the services of its various officers, particularly in the redistribution of forces, in order to obtain the greatest benefit from the Department for those in whose special interests it was originally designed. At the Exhibition of 1913, the separate State farm sections were eliminated, as it had been decided that the same results can be equally well, if not better, attained by combining the whole of them in one great Departmental Section in which all their products and experimental work receive full prominence, whilst at the same time the regular work of the farms is not impeded by the absence of the managers and assistants, necessitated by separate sections.

As a guide to visitors desirous of obtaining information on the various industries connected with the Department, whose officers were in regular attendance to afford every assistance to inquirers, a short descriptive pamphlet was issued on the ground, of which the following is a résumé.

AGRICULTURE.

EXPERIMENT PLOTS.

In connection with experiments with cereals, such as wheat, maize, and silage, a series of experiment plots was initiated along the Western and South-western railway lines, with a view to solving several of the many problems connected with the successful raising of cereals. These problems comprise research work embracing the selection of varieties suitable to respective soils and districts, the efficacy of applying certain fertilisters, and the benefit to be derived from a rational system of cultivation.

The situations determined upon for the plots were selected as being of even character and representative of the conditions obtaining in the districts in which the tests were carried out.

CROSS FERTILISATION EXPERIMENTS.

The manager of the Roma State Farm contributed a series of "screens," on which were mounted a variety of specimens of wheats, cowpeas, broom millet, and kaffir corn, which graphically illustrate the

evolution of new varieties of these plants, according to "Mendelian" laws.

Enlarged water-colour paintings of the parts of a wheat floret served to show how a self-fertilising flower has to be dealt with to effect artificial pollination.

In the first place, "colour" and "tallness" were depicted as dominant factors as occurring in the first-filial or conjugate plant, derived from a cross between the two well-known bread wheats, Bunge and Federation. Further proof is to be noted how these features are projected as single unit characters through the second (F2) and third (F3) to the fourth (F4) generation. They appear also in some instances in combination.

Another example was shown in the F1 generation, the result of crossing a bread wheat, Florence (the mother) with a Durum type, Le Huguenot (the father). The former is a very early variety, hollow stemmed, white chaffed, and somewhat soft in the grain, which is far too readily shed in the field. Except for the period taken to mature, the latter variety possesses characteristics the antitheses of those mentioned. In the "cross," certain dominant and recessive features are to be observed, and go to prove that skilful selection and interpretation of results are demanded of the plant breeder.

"Florence" is again used in a similar sex capacity with "Bishop," a Manitoba type of wheat, of late maturing habit, and possessive of a hard red grain. Here, the red colour of the latter proved to be dominant to the white.

The hardness of grain found in Durum wheats is dominant to the soft types of bread wheats. This feature is illustrated in a cross effected between "Florence" and "Bald Medeah."

Certain reciprocal crosses between two bread wheats, "Amby" and "Bunge," indicate that similar results are to be expected when either is used as a source of pollen. After studying the features previously noted, it would appear that the plant breeder has plainer sailing until he takes in hand the fixing of a variety from two distinct bald and bearded wheat families. No less than fourteen different types of heads alone were illustrated on one "screen." Finality is not reached in this, or any other instance, without careful discrimination and a knowledge born of an intimacy with a line of work fascinating in its development.

Cowpeas.—The crosses effected between distinct varieties of this plant already show some striking differences in the F1 and F2 generations. Small "colour" plates are used on the screens to indicate the changes in this feature. Other notable changes brought about in the size and shape of pods and seeds, with an infinite variety also of seed colours, open up a vista of research work bewildering in its intricacy.

Unit character inheritance is not confined to the foregoing, but extends a perceptible influence to the habit of growth of the plant. This, in itself, affects productivity and yield to a marked degree, and the latter aspect of the question is not by any means the least important.

Broom Millet and Kaffir Corn.—The results obtained, up to the present, in the cross-fertilisation of these two plants, present features of interest and possible plant improvement.

CEREALS.

The 10-acre plots for experimental wheat culture have been instituted in different districts, and were situated at:—

Wallumbilla	R. E. Nimmo.
Jackson	M. O'Mahoney, Noonga.
Miles	E. A. Scammell.
Baking Board	F. M. Bradhurst.
Chinchilla	W. P. Wheeler.
Goondiwindi	L. C. G. Cameron, Wondalli.

The varieties experimented with were Bunge No. 1, John Brown, Yandilla King, Coronation, and Bobs.

Bunge No. 1 has for the past two seasons given the best results at every centre. The yield from each variety is in the order named above. As this exhibit was grouped and labelled in such a manner that "all who run might read," and gain full information as to yields, &c., full results need not be given here.

In addition to the varieties grown on these plots, twenty-four sorts, including many promising hybrids, were experimented with on a much smaller scale with a view to testing their drought and rust-resistant qualities, the most likely sorts being selected for further tests on a more extensive scale. The varieties from the respective districts were grouped together, and formed an interesting object lesson as to their behaviour under varying conditions of soil and environment.

MAIZE.

Prominence was given to this important cereal by the display of several varieties of "stud" seed raised at the State farms and at different centres in the Killarney, Warwick, Crow's Nest, Kingaroy, and Upper Burnett districts, where plots were established with the object of propagating selected strains, derived principally from an importation from the United States of America three years ago.

The importance of standardising suitable types for this State has called for special attention. Farmers have been given an opportunity of securing limited quantities of seed for the approaching planting season, and up to the present a large number of orders have been booked.

OATS.

Amongst the nine varieties shown were several new and improved sorts, such as Tartar King, Bountiful, Swedish Select, Abundance, American Banner, Carter's Improved Tartarian, Sixty-day, Waverley, and Algerian.

The Algerian is most extensively grown for hay purposes, and, together with Sixty-day, is about the only variety suitable for our coastal areas.

The plump grain varieties are, in a rust season, very susceptible to rust.

BARLEY.

The exhibits of malting barley comprised the following varieties:—Malster, Invincible, World's Champion, and Hartell's Malting. For feed—the Nepaul or Skinless, Californian, and Cape. These were here shown both in grain and in sheaf.

LUCERNE.

Tests are being carried out at the College and on the State farms in comparing two imported varieties of lucerne with the Downs and Hunter River sorts. Samples of these were on view. Sufficient time has, however, not elapsed to enable their yielding qualities to be estimated.

ROOT CROPS, &c.

Crops suitable for pig-raising were represented by mangels, turnips, pumpkins, sweet potatoes, yams, kohl-rabi, and pie-melons.

FODDER CROPS.

A large and comprehensive collection of fodders suitable for hay, grazing, and ensilage was displayed. The collection included varieties of sorghum, panicum, millet, cow cane, cereals, vetches, grain, &c., which are indispensable in successful dairying.

COTTON.

There is perhaps no country better adapted in every way to the production of first-quality cotton than Queensland. Some years ago thousands of bales were grown here and exported to London. To-day the industry is not flourishing, the principal reason being want of the protection afforded to other industries; and cotton-picking, although it is a light labour which once employed and gave good wages to hundreds of boys and girls on farms, is not a congenial employment to white labourers, notwithstanding the fact that at ½d. per lb. pickers can earn from 8s. to 9s. per day. Samples of Sea Island, Caravonica, and Uplands cotton were here shown in the ginned and in the seed condition.

FIBRES.

Amongst the many fibres which can be produced to perfection in this State are sisal—for which there is an enormous demand in Europe and also in the States of the Commonwealth—Manila, Hibiscus, Bowstring Hemp, or Sansivieria, Ramie, and also New Zealand Flax. Here again, although soil and climate are propitious, labour conditions are prohibitive.

Excellent fibre, as shown, is produced by many of our common plants, such as rosella, pineapple, banana, &c., and also from some of our pest weeds, such as *Sida retusa,* burrs, and even from prickly pear it is said that a fibre suitable for paper-making can be obtained.

BROOM MILLET.

This crop receives a fair amount of attention from some farmers, especially from those in new districts. The yield of fibre and seed is very considerable, and prices for both are generally remunerative. Samples from both coastal and Western districts were on view.

TUBERS AND BULBS.

Amongst these the exhibit showed potatoes (both English and sweet), arrowroot (Queensland and Mauritius), cassava or tapioca. The cassava gives an enormous crop of tubers in our coastal districts, especially in the North, but the tubers of the better variety contain a poisonous principle in the juice, making them injurious to stock; but by slicing them and leaving them in the sun for a few hours, the poison (hydrocyanic acid or prussic acid) being very volatile, is soon dissipated, when the sliced roots make good fodder for stock. The cassava produces the tapioca of commerce, and samples of it and wheat and maize flour were shown.

SILAGE.

The exhibits coming under this category had been arranged primarily with the object of inducing dairymen and lamb-raisers to give attention to conserving fodder in a cheap and effective manner. Centrally disposed on a stand were models of a "Bin" silo and of a framework of poles, within which fodder can be effectively stacked. Specifications of each type appeared on the respective models. A comprehensive range of different kinds of silage was displayed. The samples had been drawn from several silos at the Agricultural College, the State Farms at Roma, Warren, and Gindie, and from stacks built at Degilbo, Mundubbera, Baking Board, Miles, Jackson, and Wallumbilla, where demonstrations were conducted on private farms by the Department last autumn. Persons who availed themselves of the opportunity for instruction in this respect have expressed themselves as well satisfied with the system of stacking. Some of the opinions are reproduced here for the benefit of other farmers who contemplate the conservation of fodder in this form. "In seven weeks after stacking I commenced to use, and came to the conclusion in a very short time that I had a valuable asset from a feeding point of view. . . . . I feed in boxes at the rate of 40 lb. per diem per cow, and cows which had been in milk from four to eight months increased their flow *fully* 50 *per cent.* Cows which have newly freshened keep up their normal first flow unfailingly, and *that during winter.* . . It is better to feed after milking than before, and I am at present obtaining an *A*1 *grade* from the factory for my cream. . . . Am well satisfied with the experiment, and have come down to the bedrock conclusion that as soon as funds will permit I will erect a silo, as after some years of experience you cannot "dairy" in the winter on artificial grasses with profit, and ensilage appeals to me as the *par excellence* winter ration."

TOBACCO.

The tobacco-leaf shown in this section was grown at Texas and Bowen respectively, each place representing a locality noted for the production of high-grade tobacco of a special class.

For several years the tobacco industry has been supervised by Mr. R. S. Nevill, under whose instruction, in the cultivation and curing of the leaf, the area under tobacco has been greatly extended, and both the yield per acre and the quality of the leaf have been so improved, that of late the value of the product has increased to a very large extent. The

industry has now been placed in such a position that the growers can carry it on without expert assistance. Some years ago, land which had been under tobacco was devoted to maize-growing; but, as the improved methods introduced by Mr. Nevill showed how a tobacco crop would pay the grower, the maize land once more reverted to tobacco, with excellent results.

Green Manures.

The importance of green manuring is beginning to be recognised, more especially in the sugar districts. Various kinds of leguminous plants which are utilised for this purpose were shown in the shape of Mauritius, Velvet, and other beans, vetches, and cowpeas. Furthermore, there were twenty new varieties of cowpea shown, which consisted of a number of crossbreds raised at the Roma State Farm with a view to evolving and propagating a hardy variety suitable for the drier portions of the State. Specimens of hybridising work done at Roma State Farm were to be seen in the court, where a separate display was made.

Agricultural College.

The institution was not represented this year as formerly, but contributed chiefly a number of samples of silage and a varied assortment of harness, saddlery, and blacksmithing work made on the premises by the students; these "industrial" branches constitute two very important sections, incidental to successfully taking up a rural life when a student's college education has been completed.

QUEENSLAND GRASSES.

A most interesting collection of these, with a descriptive list of the two hundred kinds in the exhibit, had been prepared by the Colonial Botanist, Mr. F. M. Bailey, C.M.G. It must not be claimed to represent the State's grass flora in number of kinds, though it may fairly do so in quality. Many had to be left out, as specimens were not available, and time did not allow of sending to distant parts for them. Queensland is proverbially rich in the number and nutritive character of her indigenous grasses, but when one takes into account the great extent of territory and the fertility of the soil, no wonder need be expressed at her grasses being numerous in species and abounding in nutrition. Our grasses have peculiarities also which have attracted the notice of persons of other parts. Perhaps the most striking feature is the extraordinary tenacity of life which many of them possess. To fully understand this characteristic one must have been out on our Western plains during a drought, and been a witness to the breaking up of the dry time or of a fall of rain for a day or so to fully believe in the magic-like change which comes over the country. The old, dry, hard clumps or tufts of grass, which to all appearance before the fall of rain were dead, will be found in only a few days' time covered with green leaf and affording abundant food for the famishing stock. "This," says Mr. Bailey, "I have often stated, but it cannot be too often repeated. In the following descriptions no mention is made of height or time of flowering, since so much of this depends upon the rainfall. In years gone by the seeds of the indigenous

grasses formed in some districts the principal food of the natives, and the early squatters were never tired of praising the nutritive properties of the grasses and the auxiliary herbage which then covered the land, particularly the Darling Downs. This mixed herbage has been badly used by overstocking in some places, and in most parts by allowing exotic weeds to overrun the primeval fodders, and which probably, in some localities, have almost obliterated them, but so tenacious are our plants that where they have been given the least chance they are to be seen springing up again in wild luxuriance, although their roots or seeds may have lain in a semi-dormant state for years."

FARM AND STATION BUILDINGS.

SILOS, DIPS, ABATTOIRS, FACTORIES, ETC.

Plans of various structures which have been erected or suggested either by the Department or by farmers who have sought advice on what has appeared to them at times to be a difficult subject.

The collection included silos of various kinds, cattle and sheep dips and sprays, piggeries, milking sheds and bails, cowsheds, calfpens, dairies, slaughter-houses, stables, small cheese factory, and butter factory—all of which are useful to farmers individually or in co-operation. Plans and photos. were also exhibited of the buildings, comprising the Diseases in Stock Experiment Station, Yeerongpilly; the new dairy building at Gatton College, all of which were designed and erected by this branch of the Department; and of the Stock Quarantine Station buildings at Townsville, now in course of erection.

The Department is always willing, through its officers, to give the best expert advice to those on the land on the subjects of drainage, irrigation, and water supply, and the correspondence passing through the office in these technical subjects is indicative of the appreciation of the public of this branch of its work.

DAIRYING.

A dairy building, of the design recommended by the Dairy Expert, formed part of the exhibit displayed in the Agricultural Court.

In the designing of the structure all features of advantage leading towards the ultimate production of cream of high merit in quality have been carefully considered, while the cost has been kept within the reach of the average dairy farmer.

Provision has been made for ample ventilation, abundant light, protection of the milk and cream from contact with particles of dust, the exclusion of flies, and good drainage facilities.

The overlapping roof adds to the coolness of the atmosphere within the structure, and affords a covering under which the cleansing of the dairy utensils may be conveniently carried out.

The floor is of an impervious nature, and is set with a fall of several inches, consequently it is easy to cleanse, and dries quickly after it is scrubbed.

The fluid waste from the dairy is "caught up" in a suitable drain, which, it is intended, should be extended and made to convey the refuse beyond the limit of possible contamination.

The dado around the walls gives a smart appearance to the inside of the dairy, but the utility of the device rests in the fact that the walls up to the height of the dado may be periodically washed, and kept free of all stains of milk or cream, which, if allowed to remain undisturbed, speedily develop growths of mould and other micro-organisms, ever ready to infect the exposed milk and cream supplies, and materially injure its quality.

A screened door, supported by self-closing hinges, provides an effective means of preventing the entrance of flies into the dairy.

At each corner of the dairy building there are shown, in sections, the various designs and the materials recommended for use in the construction of the walls.

Thorough ventilation is secured by placing wire gauze around top of walls, close to the eaves.

The appliances necessary for use in connection with the cleansing of the dairy utensils, and convenient places for their storage, awaiting use, are to be found in the dairy building.

Among the dairy accessories is a cooler and aerator of modern type, and by its use milk and cream may be cooled and aerated.

It is not, however, sufficient to only temporarily reduce the temperature of cream; and, for the purpose of retaining the fluid at a comparatively low temperature, a cooling cabinet has been devised in which the cream supply may be placed awaiting its despatch to the factory.

The cabinet is portable and sectional in construction, consequently it is readily amenable to thorough cleansing, and quite capable of providing a chamber of sweet and cool air in which the cream may be lodged.

On the three latter days of the Exhibition practical demonstrations were given of the methods of the treatment of the cream supplies on the dairy farm, as advocated by the Department of Agriculture.

Provided that all other processes incidental to the production of milk and cream are carried out in keeping with the system demonstrated, and the cream be despatched to the factory at frequent intervals, it is absolutely certain that the percentage of cream of secondary quality would be infinitesimal, and, as a result, the present charge against the industry accruing from such a cause would be permanently removed.

Entomology and Ornithology.

During the past forty or fifty years many plant pests, insect and fungoid, have been at various times introduced, which were utterly unknown and non-existent in the State when the young colony of Queensland started on its career as first a pastoral and next as an agricultural country. The introduced pests eventually became a menace to many rural industries, necessitating expert advice in combating them. With this view, the appointment of an entomologist was determined on, and by this means many pests have been practically banished, and others held

in check, whilst the greatest care has been exercised to prevent the introduction of any new and possibly ruinous pest, even, in some cases, of alleged useful parasitic insects which have been shown to have contributed to the elimination of insects destructive to economic plants and fruits. Following is a short description of the various insects shown in the exhibit:—

ENTOMOLOGICAL AND PATHOLOGICAL SPECIMENS.

No. 1.—Consisting of seventeen showcases illustrating the life-histories of many of our commoner insect pests, such as the potato moth, pumpkin beetle, fruit fly, maize moth, etc., etc.

This exhibit was particularly instructive, and designed for the purpose of enabling farmers and fruitgrowers to recognise at a glance the various stages in the transformation of economic insects. The numerous original water-colour magnifications from nature of eggs, and the larvæ and pupæ of small insects, etc., are very helpful and add considerable interest to the exhibit.

No. 2.—A collection of Queensland insect pests, arranged under the various fruits and vegetables subject to their attacks.

The collection was not quite complete, but included such notorious pests as the codlin moth, army worm, sugar-cane borer, banana weevil, bean fly, and many other serious foes of the agriculturist.

No. 3.—An exhibit of Queensland butterflies, moths, and beetles, the majority of which are well-known insects. The beautiful moths with pale blue or green wings are not easily procurable, their larvæ being wood feeders, and difficult to breed successfully. Some of those lovely moths are exceedingly rare, and in few collections. The gigantic grey and brown-winged moths are somewhat similar in habit to the above, and occasionally enter houses on warm nights, being attracted by bright lamp-light.

No. 4.—A large showcase, illustrating the life-history of the common Emperor moth.

This exhibit was designed in Victoria for the Education Department, as an object lesson for students of Nature Study, and deals with the transformations and economy of one species of moth. It was presented to the Queensland Department of Agriculture in 1908 by Mr. Edmund Jarvis, Assistant Entomologist.

No. 5.—This exhibit should prove of special interest to the man on the land, and consisted of a small collection of fruits and vegetables affected by various fungus diseases, and injured by insects, etc. Attention was directed to the assortment of potato and citrus diseases, which include such well-known maladies as "Irish blight," scab, eel-worm, rhizoctonia, brownfleck, and black shank of the potato; and "Maori," red scale, scab, fruit fly, and black spot of oranges and lemons. A label giving a short description of the disease and the remedy was attached below each specimen.

No. 6.—This attractive exhibit consisted of an almost complete collection of our insectivorous birds of the Moreton district, and is undoubtedly

the finest of the kind in the southern hemisphere. It may be seen in the museum of the Department of Agriculture and Stock.

Farmers are beginning to understand that these small birds render valuable assistance by helping to thin the numbers of injurious insects, which, but for such timely assistance, might occasion considerable financial loss. It is to be hoped that growers may speedily realise the fact that many of our small insect-eating birds are literally worth their weight in gold, and that in the future they will not only endeavour to protect them from direct injury, but encourage them to breed, by providing, when necessary, suitable cover for nesting and shelter, and by taking care that such spots are not invaded by the heartless pot-hunter, whose destructive pea-rifle still continues to cost the farmer so dearly.

SHEEP AND WOOL.

Sheep Dip, Salt Lick, Etc.

The importance of the pastoral industry of Queensland, particularly in respect to wool-production and lamb-raising for oversea markets, can scarcely be overrated, and all that tends to its welfare is of paramount importance to graziers throughout the State. The exhibit of the Department of Agriculture and Stock was a new departure in the annual exhibit of the Department, and formed the nucleus of an extensive and complete exposition of the typical wools of the various districts of Queensland.

These exhibits are not quite complete, as shearing time is just coming on in some districts, and is over in the others.

Altogether there were thirty-two fleeces, illustrating about ten districts, distinguished by the name of the principal town in that district.

Besides these, scoured wools and greasy wools were placed on the outside of the walls as decorative media.

A number of cards, illustrated the crossing of the various breeds. These cards indicated the various British breeds, with their various crosses. Pure Lincoln (say) ¾ Lincoln, ½ Lincoln, ¼ Lincoln, pure Merino, and so on through the white-faced breeds. It is proposed, if possible, to supplement these with the black-faced crosses. There were, also, a number of illustrative cards showing the wools after going through the combing and carding processes.

An interesting and instructive exhibit was shown in the model of a new method of dipping sheep. This is the shower system, as opposed to the plunge bath. The advantages of the new method, which was seen operating at the kiosk, are obvious. The description of this dip or shower was given in the "Queensland Agricultural Journal" for January and February, 1913, under the title of "The Tandawanna Sheep Dip."

Salt Box.

This is a very simple and effective automatic means of dispensing salt to sheep. So many flocks on the Downs and coastal country have been affected with stomach worms recently that it cannot be too well

known that the administration of salt and sulphate of iron (both vermifuges) will go far to keep down the ravages of the pest.

This box may be made to hold a week's, a month's, or a year's supply to paddocked sheep, and will repay close inspection.

CHARTS SHOWING COMPOSITION OF FODDERS AND FOOD EQUIVALENTS.

Two charts showed in a graphical method, the composition of fodders in general use, which appeared in table form in the July "Agricultural Journal." The various constituents are shown in different colours, and the actually digestible portion of each constituent by a darker shading. The figures themselves give the pounds of food constituents in every 100 lb. of fodder. One chart illustrates the composition of green fodders and the other of dry fodders. The richness of some of the by-products—like cotton-seed meal, linseed meal, etc.—is very apparent.

The flesh-forming constituents—the proteins—are shown in red, and the nitrogen force constituents—under the headings carbohydrates (starch, sugar, etc.) in blue, crude fibre in green, and crude fat in yellow—are all heat or energy producing.

A second series of charts illustrates the food equivalents, or the starch and protein value of each fodder, expressed as the quantity in pounds required to be fed daily to a cow 950 to 1,000 lb. live weight, yielding daily about 25. lb. of milk. Such a cow requires a minimum daily ration of 25 lb. of dry material, containing 19 lb. of protein, and 11 lb. of constituents valued as starch.

A horse fairly heavily worked would require about the same amount per 1,000 lb. live weight.

In all cases where the amounts of fodder necessary to supply proteins and starch are practically the same, we know the fodder to be a well-balanced ration. We find from the chart of dry fodders that 16 lb. of wheat grain are necessary to supply the required amounts of protein and of starch, but, of course, as an actual ration this amount would be too small, as the fodder would not contain the necessary amount of dry material, which would have to be supplied by an addition of coarse fodders, as straw, etc.

We learn from an inspection of the charts that many of the green fodders—more particularly root crops and tubers—have to be fed in very large quantities to supply the necessary amount of food constituents, and should, for this reason, be supplemented by small amounts of more nutritious foods—as grain, meal, by-products, etc.

The fact that not the whole amount of food constituent given as digestible is really available to the animal for productive purposes must be borne in mind, as in many of the coarser fodders a large amount of energy is wasted in mastication and digestion. In the case of coarse fodder—like straw—this waste amounts to about two-thirds, and therefore the amounts actually to be fed would have to be multiplied by three. On the other hand, in the case of easily digestible fodders—like roots, tubers, grains, and meals—the amounts given are practically all available to the animal for productive purposes.

Fruit.

With the view of illustrating the various fruits that are in season at this time of the year, the Department had a collection made for display consisting of the following varieties:—

Citrus Fruit.—Scarlet, Emperor, Canton, Beauty of Glen Retreat, and Ellendale Beauty, all of the Mandarin class.

Oranges—Navels, St. Michaels, Mediterranean Sweet, Valentia, late Jaffa, and Sevilles, all of which were from the Blackall Range.

Bananas of the following varieties were also shown:—

Plaintains, Cavendish, Laubin's, Lady's Finger and Sugars, from the districts of the Blackall Range, Cleveland, Samford, and Redland Bay.

Pines.—Smooth Leaf from Redland Bay, Ripley Queens from the Cleveland district, and Queen pines from Nundah.

Strawberries from Wellington Point.

Papaws from Manly.

Passion Fruit from Mount Cotton.

Tomatoes from Pinkenba.

Cape Gooseberries from Palmwoods.

Lemons from the Roma State Farm.

ANIMAL PATHOLOGY AND BACTERIOLOGY.

In the exhibit from the Stock Institute at Yeerongpilly were numerous museum specimens illustrating various manifestations of diseases discovered in cattle, sheep, swine, and other animals; also collection of section of pathological tissues, micro-specimens and tube cultivations of various micro-organisms associated with animal disorders.

The principal items of interest displayed in the exhibit were the following:—

Tuberculosis.—Manifestations of the disease in different domesticated and wild animals, showing lesions in the lungs, liver, spleen, lymphatic glands, bones of the back and limbs, omentum, mesentery and intestines.

Actinomycosis (Lumpy Jaw).—Growths of this disease affecting the upper and the lower jaw, tongue, flanks, scrotum, lungs, and liver.

Note.—This disease sometimes resembles and may be mistaken for tuberculosis.

Pleuro-Pneumonia.—Lungs showing typical marbled appearance, enlarged lymphatic glands.

Tick Fever.—Spleen, liver, and kidneys showing characteristic post-mortem lesions. Blood smears stained to show tick fever organisms.

Ticks.—This collection illustrates ticks in various stages of deveolpment on the skin of cattle, sheep, and horses. Specimen glasses containing ticks in all stages of their life-history—fully-developed males and females, eggs, larval ticks and nymphs.

Blackleg.—Portion of the affected muscle taken from calves and sheep, showing the dark-coloured tissues with pronounced effusion of serous fluid and gas formation.

Swine Fever.—Specimens of the stomach and intestines showing the typical ulceration of the inside lining membrane.

Malignant Growths.—Including cancer, epithelioma, carcinoma, sarcoma, &c.

Internal and External Parasites.—These include flukes, hydatids, tape worm, round worm, thread worm, worm nodules in beef, larvæ of the warble fly, bots, acari, lice, and ticks.

A Collection of Hair Balls found in the stomach of healthy cattle, horses, sheep, pigs, dogs, and cats.

Diseases of Poultry, dealing with chicken cholera, fowl enteritis and diphtheria; and parasitic diseases, as scaly-leg, and the red mite which is the cause of warts.

ECONOMIC AGRICULTURAL BACTERIOLOGY.

Under the heading of what may be termed Economic Agricultural Bacteriology there was an interesting and varied display, including the following:—Vaccines, viruses, and serums prepared at the Laboratory at Yeerongpilly and used successfully in the prevention of the respective animal diseases. These include black-leg vaccine, pleuro-pneumonia virus, blood serum for tick fever, and auto-vaccine for sepsis and tuberculosis.

Appliances necessary for use in connection with the preparation and the inoculation of blackleg vaccine, tick fever blood, pleuro-pneumonia virus, &c.

Cultures of lactic acid ferment now being used extensively in the ripening of cream and milk in various butter and cheese factories.

Plate and tube cultivations of micro-organisms illustrating method of bacteriologically examining water supplies for meatworks, butter and cheese factories, and various articles of fresh, preserved, and canned foods.

PURE CULTIVATION OF DISEASE-PRODUCING AND HARMLESS ORGANISMS GROWING IN TUBES OF ARTIFICIAL NUTRIENT MEDIA.

Tubercle Bacilli (Consumption germs) Human and Bovine	Canine Distemper
Malignant Œdema	Pus-producing Organisms
Blackleg	Chicken Cholera
Anthrax	Fowl Enteritis
Coli Communis	Locust Fungus
Typhoid Fever	Lactic Acid
	Butyric Acid.

Also a number of colour-producing bacteria and mould fungi.

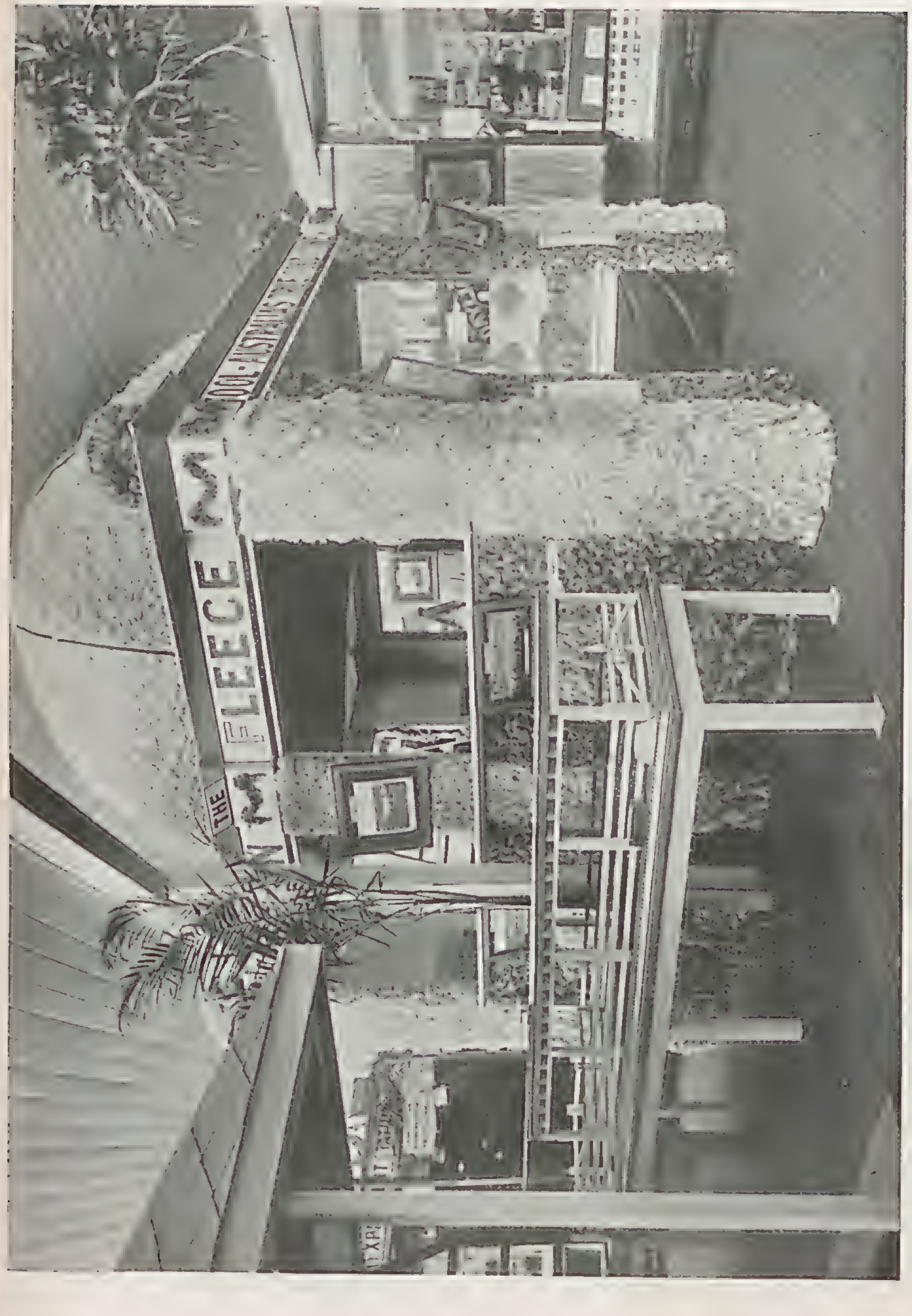


PLATE 106.—DEPARTMENTAL COURT, NATIONAL AGRICULTURAL ASSOCIATION'S SHOW, BRISBANE, 1913. WOOL TROPHY AND MODEL OF TANDAWANNA SHEEP DIP.

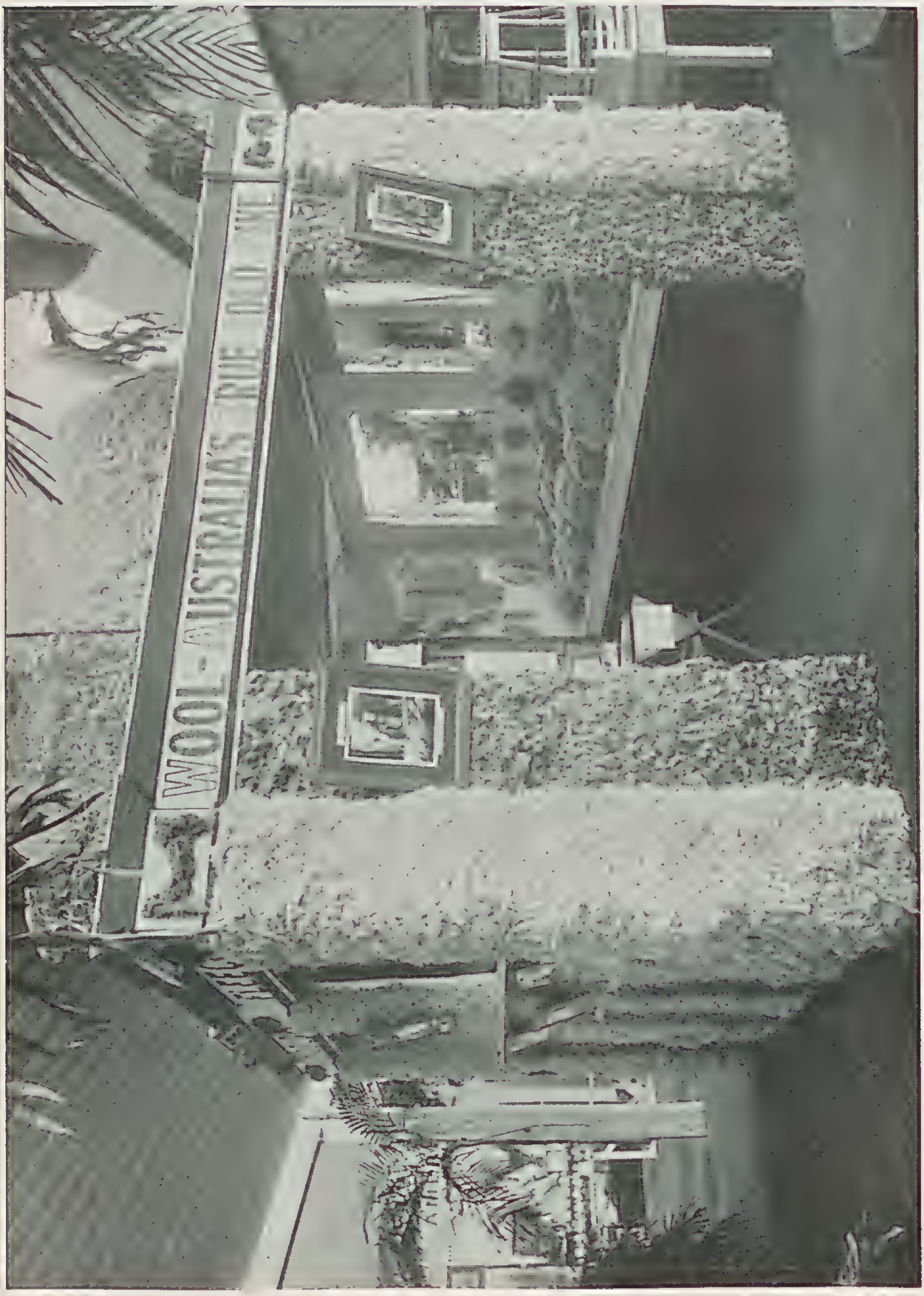


PLATE 107.—DEPARTMENTAL COURT AT NATIONAL AGRICULTURAL ASSOCIATION'S SHOW, BRISBANE, 1913.
WOOL TROPHY.

Plate 108.—Departmental Court, Kamerunga State Nursery Exhibit, National Association's Show, Brisbane, 1913.

PLATE 109.—FRONT OF DEPARTMENTAL COURT (AGRICULTURE AND STOCK) NATIONAL AGRICULTURAL ASSOCIATION'S SHOW, BRISBANE, 1913.

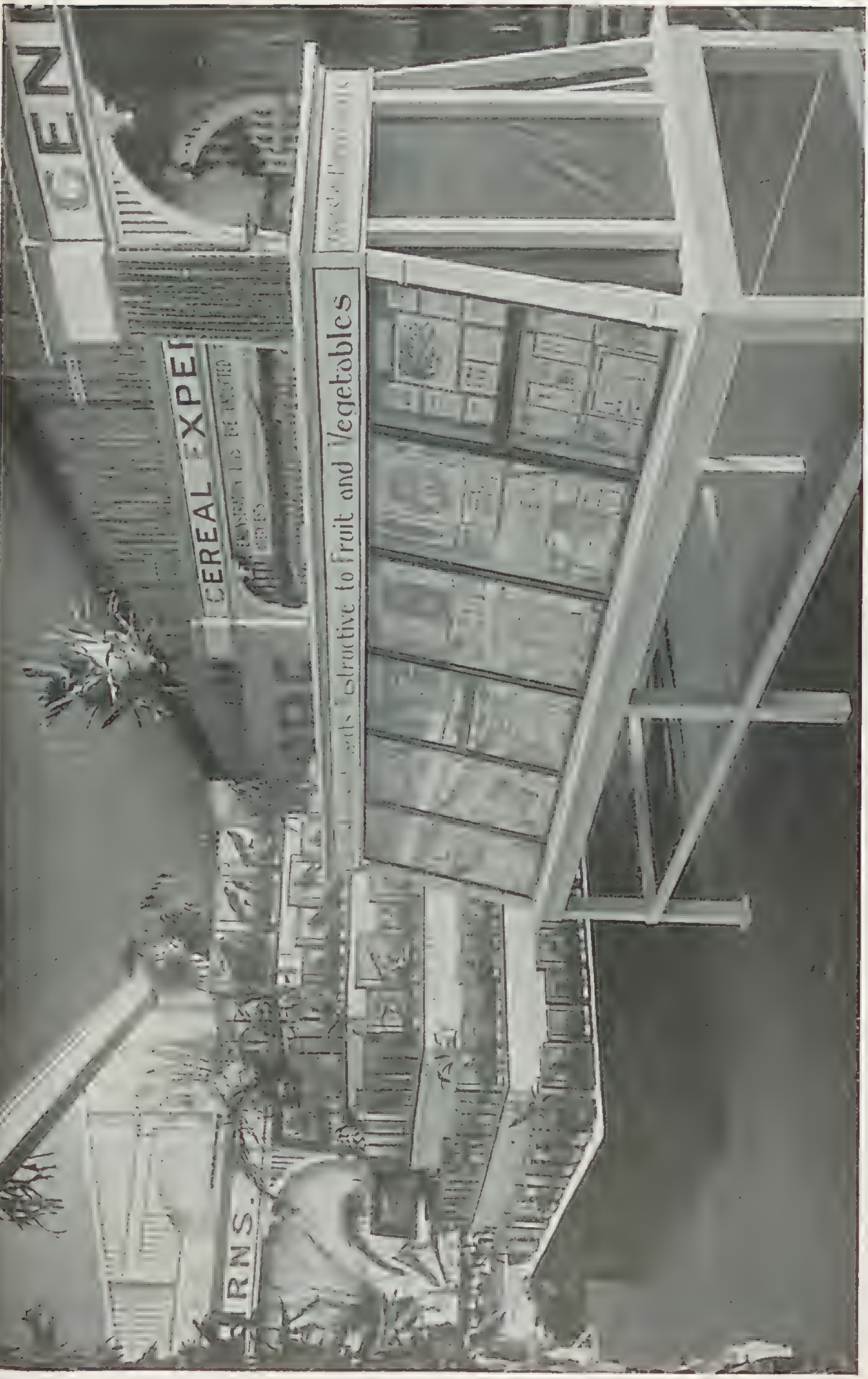


PLATE 110.—DEPARTMENTAL COURT AT THE NATIONAL AGRICULTURAL ASSOCIATION'S SHOW, BRISBANE, 1913.
ENTOMOLOGICAL BRANCH—INSECTIVOROUS BIRDS AND LIFE HISTORIES OF INSECTS DESTRUCTIVE TO FRUIT AND VEGETABLES.

PLATE 111.—DEPARTMENTAL COURT, NATIONAL ASSOCIATION'S SHOW, BRISBANE, 1913.
PRODUCTS OF COCOANUT TROPHY—KAMERUNGA STATE NURSERY EXHIBIT.

Plate 112.—Fassifern District Exhibit—Front View—Winner of First Prize.

Plate 113.—Fassifern District Exhibit—A Corner of the Interior.

PLATE 114.—ONE-MAN FARM EXHIBIT, NATIONAL AGRICULTURAL ASSOCIATION'S SHOW, BRISBANE, 1913.
WINNER OF FIRST PRIZE—H. FRANKE.

EXHIBITION EXHIBITS.

ONE-FARM EXHIBITS.

There was only one farm entered in this section for competition, which is a matter for regret, as it cannot fail to be of vital interest, to new as well as to old settlers on the land, to have ocular demonstration of what it is possible for an energetic up-to-date farmer who thoroughly understands the meaning and value of "intense culture" to accomplish, provided, of course, that the soil and climatic conditions be favourable, or that he possesses the means of regularly irrigating and manuring his various crops. The exhibit of Mr. H. Franke, of Cawdor, near Toowoomba, was a real object lesson in this respect. There were exhibits of the various agricultural, horticultural, orchard, and dairying products, which thrive on the Darling Downs, products of the smoke house, of the market garden, besides wool, silage, &c. The domestic products were also various and excellent, and included various articles of confectionery, cakes, preserved fruits, pickles, jams, besides many fine samples of needlework, &c., the work of Mr. Franke's family. We hope next year to see more of these useful "One Farms" in competition.

MILKING TESTS.

THE RESULTS.

The milking tests this year provided plenty of competition, for no fewer than seventeen animals faced the judge. The tests were conducted as usual by Mr. R. W. Winks, the judge, and the milking and general inspection was under the personal supervision of the council steward, Mr. W. J. Affleck. In the extended table used in connection with the tests (given below) it will be noticed that two cows failed in their first milking to qualify, owing to the regulations providing that a cow whose milk contains less than 2.8 per cent. of butter-fat shall be disqualified. This furnishes an illustration of one of the unsatisfactory features of milking tests at shows, for frequently cows fail to give their full yield under conditions which are new and changed to them.

The awards were—

CLASS 135.—Cow averaging the greatest yield of butter-fat in 48 hours (prizes, first £6, second £4, third £2, of which £10 10s. is presented by the Brisbane Tramways Company, Ltd.): McIntyre Brothers' Fancy, 3.574 lb. of commercial butter; lactation allowance, 8.3; total points, 36.89—1. T. S. Champney's Canary, 3.01 lb. commercial butter; lactation points, 12; total points, 36.08—2. A. Rodger's Beauty, 4.029 lb. commercial butter; lactation points, 2: total points, 34.22—3.

DETAILS OF THE MILKINGS.

The following are the details of the milking tests, for all cows competing:—

—	—	Milk Yield.	Test.	Butter Fat.	Commercial Butter.	Lact'n. Points.	Total Points.
		lb. oz.					
McIntyre Bros.' Fancy, Shorthorn; weight 8 cwt. 2 qr. 14 lb., 5 years; calved 13 April, 1913	M.	18 8	4·2	·756	·836	..	..
	E.	20 0	4·7	·940	1·047	..	..
	M.	20 11	3·7	·765	·839	..	..
	E.	21 10	3·6	·778	·852	8·3	..
		80 5	..	..	3·574	..	36·89
T. S. Champney's Canary, Jersey; weight 8 cwt., 10 years; calved 7th March, 1913	M.	13 5	5·0	·665	·743	..	..
	E.	16 0	4·7	·752	·837	..	..
	M.	16 10	3·8	·631	·694	..	..
	E.	16 11	4·0	·667	·736	12	..
		62 10	..	..	3·01	..	36·08
A. Rodgers's Beauty, Shorthorn; weight 9 cwt. 1 qr. 21 lb., 7 years; calved 5 June, 1913	M.	26 5	3·0	·789	·851	..	..
	E.	26 1	3·8	·990	1·088	..	..
	M.	26 15	3·6	·969	1·061	..	..
	E.	26 2	3·6	·940	1·029	2	..
		105 7	..	..	4·029	..	34·22
S. Holmes's Jaunty of Coolangatta, Ayrshire; weight 9 cwt. 2 qr. 17 lb., 7 years; calved 11 June, 1913	M.	25 4	3·1	·782	·846	..	..
	E.	23 12	4·0	·950	1·057	..	..
	M.	24 10	3·4	·837	·912	..	..
	E.	24 11	3·9	·962	1·06	..	..
		98 5	..	..	3·875	..	32·99
McIntyre Bros.' Lark II., Shorthorn; weight 8 cwt. 0 qr. 21 lb., 5 years; calved 18 July, 1913	M.	24 7	3·6	·871	·963	..	..
	E.	24 8	3·8	·931	1·023	..	..
	M.	23 11	3·7	·876	·961	..	..
	E.	24 1	3·9	·938	1·033	0	..
		96 11	..	..	3·980	..	31·84
M. Lawrence's Dairymaid; weight 9 cwt. 3 qr.; calved 16 June, 1913	M.	25 13	3·3	·851	·926	..	..
	E.	21 13	4·1	·894	·987	..	..
	M.	24 3	3·1	·749	·811	..	..
	E.	25 9	3·4	·869	·945	0	..
		97 6	..	..	3·669	..	29·34
R. C. Bowman's Flower, Illawarra; weight 9 cwt. 0 qr. 25 lb., 7 years; calved July, 1913	M.	27 6	2·2	·602	·629	..	..
	E.	27 0	3·3	·891	·968	..	..
	M.	26 1	2·8	·729	·781	..	..
	E.	27 4	3·4	·926	1·008	0	..
		107 11	..	..	3·386	..	27·08
Hunt Bros.' Cherry of Springdale; weight 8 cwt. 0 qr. 14 lb., 6 years; calved 9 July, 1913	M.	19 3	3·7	·710	·777	..	..
	E.	18 13	4·0	·752	·827	..	..
	M.	18 4	3·8	·693	·762	..	..
	E.	18 13	3·8	·714	·785	0	..
		75 1	..	..	3·151	..	25·20
S. Holmes's Agonist, Ayrshire; weight 8 cwt. 0 qr. 14 lb., 6 years; July, 1913	M.	22 9	3·4	·767	·843	..	..
	E.	21 12	3·3	·717	·780	..	..
	M.	22 13	3·1	·707	·764	..	..
	E.	23 7	3·6	·843	·923	0	..
		90 9	..	..	3·301	..	26·40

DETAILS OF THE MILKINGS—*continued.*

—	—	Milk Yield.	Test.	Butter Fat.	Commercial Butter.	Lact'n. Points.	Total Points.
		lb. oz.					
W. F. Hammel's Plum, Illawarra; weight 7 cwt. 0 qr. 21 lb., 8 years; 26 June, 1913	M.	22 0	3·4	·748	·814	..	..
	E.	18 12	3·7	·693	·759	..	..
	M.	16 14	3·0	·506	·545	..	..
	E.	16 2	4·6	·741	·825	0	..
		73 12	..	..	2·943	..	23·53
W. F. Hammel's Dora, Illawarra; weight 9 cwt. 1 qr. 14 lb.; 11 May, 1913	M.	15 15	3·2	·510	·553	..	..
	E.	15 2	3·3	·499	·542	..	..
	M.	15 6	3·3	·551	·551	..	..
	E.	16 0	3·4	·592	·592	5·5	..
		62 7	..	..	2·238	..	23·40
J. A. Nystrom's Beauty of Booie, Illawarra; 11 cwt.; calved 2 May, 1913	M.	18 6	2·4	·441	·464	..	..
	E.	21 2	4·2	·887	·981	..	..
	M.	20 4	3·2	·648	·702	..	..
	E.	19 14	3·2	·636	·689	6·4	..
		79 10	..	..	2·836	..	29·08
P. Biddles' Judy, Illawarra; weight 8 cwt. 3 qr. 14 lb.; 7 years; 9 July, 1913	M.	17 15	3·3	·591	·643	..	..
	E.	18 10	3·6	·670	·733	..	..
	M.	17 15	4·2	·753	·833	..	..
	E.	17 0	3·7	·629	·689	0	..
		71 8	..	..	2·898	..	23·18
P. Biddles' Lady Robinson, Illawarra; weight 7 cwt. 3 qr. 14 lb.; 20 June, 1913	M.	14 6	3·7	·531	·582	..	..
	E.	16 1	3·3	·530	·576	..	..
	M.	16 12	4·1	·686	·758	..	..
	E.	16 9	3·9	·645	·711	0	..
		63 12	..	..	2·627	..	21
A. T. Small's Duchess of Woodroyd, Ayrshire; weight 5 cwt. 3 qr. 7 lb.; 3 years; 25 February, 1913	M.	13 12	3·6	·495	·541	..	..
	E.	12 5	4·2	·517	·572	..	..
	M.	12 14	3·7	·476	·522	..	..
	E.	13 3	3·6	·474	·519	0	..
		52 2	..	..	2·154	..	17·23
Hunt Bros.' Maud, Illawarra; weight 7 cwt. 0 qr. 14 lb.; 4 years; June, 1913	M.	12 14	3·3	·424	·461	..	..
	E.	13 14	4·0	·530	·584	..	..
	M.	13 1	3·8	·496	·545	..	..
	E.	13 14	3·6	·499	·546	0	..
		53 1	..	..	2·136	..	17·08
John Carr's Nellie II., Jersey; weight 8 cwt. 0 qr. 14 lb.; 8 years; 21 July, 1913	M.	16 15	3·1	·525	·567	..	..
	E.	16 13	3·1	·521	·563	..	..
	M.	15 14	3·5	·555	·606	..	..
	E.	15 13	3·5	·553	·604	0	..
		65 7	..	..	2·340	..	16·27

Special Prize XXVI. goes with the foregoing.

Special Prize XXVII. (£5 5s.) for cow or heifer under 4 years, yielding largest quantity of commercial butter in 48 hours: A. T. Small's Duchess of Woodroyd, 2.154 lb.; lactation points, nil; total points, 17.23—1.

Special Prize XXVIII. (£5 5s.) presented by the Brisbane Tramways Company, Ltd.), for cow yielding the largest amount of butter-fat; no lactation allowance: A. Rodger's Beauty, 4.029 lb. commercial butter, 1.

Special Prize XXIX. (£1 1s.) presented by Mr. Wm. Thorne), for Jersey cow yielding the largest quantity of butter-fat; no lactation allowance: T. S. Champney's Canary, 3.01 lb. commercial butter, 1.

CLASS 136 (£4, £2, and £1).—Cow giving largest supply of milk in 48 hours, of not less than 3 per cent. of butter-fat: A. Rodger's Beauty, 105 lb. 7 oz., 1; S. Holmes's Jaunty of Coolangatta, 98 lb. 5 oz., 2; M. Lawrence's Dairymaid, 97 lb. 6 oz., 3.

Special Prizes XXX. (£5 5s.), XXXI. (trophy £2 2s., presented by E. Sachs and Co.), and XXXIA. (£5 5s., presented by Chapman and Co.), same as above.

National Champion Butter-fat Test, £25 special prize, and a cash prize of £2 2s. yearly to the winner (presented by the Brisbane Newspaper Company): M'Intyre Brothers' Fancy.—From the "Brisbane Courier" report.

THE BUTTER AWARDS.

Mr. Graham, Dairy Expert, Department of Agriculture and Stock, has furnished, in his capacity of judge of the butter exhibits at the late Exhibition at Bowen Park, the following official record of the awards in the various clases, showing the aggregate positions of the competitors:—

—	Unsalted.	Unsalted for Export.	Fresh Factory made.	Thirty days' Storage.	Eight weeks' Storage.	Salt.	Aggregate.
Downs Co-operative Dairy Company, Ltd., Toowoomba	93	93	94	93	89	91	553
Queensland Farmers' Co-operative Company, Ltd., Boonah	91	91	93	92	90	91	548
Maleny Co-operative Dairy Company, Ltd., Maleny	92	92	91	91	90	91	547
Maryborough Co-operative Dairy Company, Ltd., Kingaroy	92	92	92	88	91	90	545
Inverell Co-operative Butter Company, Ltd., Inverell, N.S.W.	90	90	90	92	93	89	544
Queensland Farmers' Co-operative Company, Ltd., Grantham	91	91	94	91	90	87	544
Pommer Bros., North Ipswich Ice and Butter Factory, Ipswich	90	90	92	91	90	90	543
Alstonville Refrigerating Company, Alstonville, N.S.W.	91	91	89	91	91	89	542
Logan and Albert Co-operative Dairy Company, Ltd., Beaudesert	89	89	90	91	92	91	542
Mount Bismarck Co-operative Dairy Company, Ltd., Mount Bismarck	90	90	92	89	91	89	541
Roma Dairy Company, Roma ..	92	92	91	88	89	88	540
Caboolture Co-operative Company, Ltd., Caboolture	90	90	91	90	90	88	539
Warwick Butter and Dairying Company, Ltd., Allora	90	90	89	91	87	91	538
Downs Co-operative Dairy Company, Ltd., Miles	89	89	90	91	90	89	538

—	Unsalted.	Unsalted for Export.	Fresh Factory made.	Thirty days' Storage.	Eight weeks' Storage.	Salt.	Aggregate.
Queensland Farmers' Co-operative Company, Ltd., Booval	89	89	92	90	88	90	538
Maryborough Co-operative Dairy Company, Ltd., Maryborough	90	90	91	88	89	89	537
Downs Co-operative Dairy Company, Ltd., Clifton	90	90	91	87	90	89	537
Marburg Butter Company, Marburg	91	91	90	90	87	87	536
Maryborough Co-operative Dairy Company, Ltd., Biggenden	91	91	90	88	88	88	536
Queensland Farmers' Co-operative Company, Ltd., Laidley	90	90	91	88	86	91	536
Warwick Butter and Dairying Company, Ltd., Texas	89	89	90	88	91	88	535
Silverwood Dairy Factory Company, Ltd., Terror's Creek	88	88	90	89	90	88	533
Silverwood Dairy Factory Company, Ltd., Gatton	88	88	90	91	86	90	533
Goombungee Co-operative Dairy Company, Ltd., Goombungee	..	..	90	91	89	91	361
Stanley River Co-operative Company, Ltd., Woodford	..	..	90	88	87	89	354
Warwick Butter and Dairying Company, Ltd., Warwick	..	..	..	90	91	91	272
Esk Dairy Company, Esk	..	..	..	90	89	93	272
Chinchilla Co-operative Dairy, Chinchilla	..	..	..	87	..	87	174

A GOOD WHITEWASH.

We have many inquiries as to how to make a durable whitewash, and several recipes have been published in this journal. Yet still the demands for information come in. Here is a recipe given by an expert painter of Ontario (U.S.A.), who says it will not rub off, especially when applied to smooth surfaces:—

Whitewash requires some kind of grease in it to make it durable. Any kind of grease, even though it be old and partly spoiled, will be all right, though tallow is best. The grease imparts to the whitewash an oil property the same as in good paint.

To a 40-gallon barrel, say, of whitewash thinned ready to use, have incorporated in it 10 lb. of tallow or any grease; mix in lime in the slacking stage, also 10 lb. of salt. In order to incorporate the grease properly, it is necessary to put it in a vessel on the stove, and boil it into a part of the whitewash so as to emulsify and get it into such condition that it can be properly incorporated with the whitewash mixture. Use your judgment; on smooth wood or hard stone it needs a stronger binder than it would on cement or rough sawed timber, which would do with less. Experience will lead you up to doing or having a good job done this way.

Pastoral.

THE MAGGOT-FLY.

By W. G. BROWN, Wool Expert.

The pastoralist seems to be surprised this year at the advent of the maggot-fly, and from the discussion in the newspapers one would think that it was quite a new thing to Queensland. This is not so, for I knew of its ravages in 1896 on Coongoola, Warrego River. In June of that year it was noticed, at lamb-marking time, that a number of ewes had lost part of their fleece, and some had been newly struck. Beyond dressing the newly-blown sheep, however, nothing was done, and little concern felt. In the following year, however, a very noticeable increase was observed of fly-blown sheep on the shearing-board, and as there was a considerable shortage in numbers it seemed, in the absence of any other adequate reason, that the fly was responsible for their losses, and preparation was made to look out for the stricken sheep. The big drought set in, and, as is usual in a dry time, the fly was very little in evidence. It was not until the break of the drought, in 1902, that the fly became troublesome again, and now that we have enjoyed an almost uninterrupted series of ten years of good and overflowing seasons there is the fly trouble. It is a calamity, and how great a calamity only those who saw it in the Central district in the autumn know.

The blue fly has been in the West for at least thirty years. I can speak for that period of time, and thirty years ago I saw a blanket blown from top to bottom as it hung on a line. I saw also a bale of skin wool blown all over, and there must have been thousands of flies on that particular job.

Now that the flies have transferred their attention to the sheep, what is to be done? Until lately it seemed obvious that the sheep should either be treated when struck or that preventive measures should be taken against the attack of the fiy. A curious part of the question, and one which makes the task of treatment difficult is—*A dressing which is effective this season may be useless next season.*

Dipping with a poisonous dip gives a fair degree of immunity, with the added advantage of being advantageous to the wool. Partial immunity, however, is not enough.

Shearing in the autumn gives immunity for about six months—that is, immunity for the autumn months; but with six months' wool on their backs the sheep are liable to be struck by the spring crop of flies, if there is anything like a drooping season.

These processes are merely palliatives. It has come, however, after a multitude of experiments in the direction of curing the effects of the fly—it has come, I say, to be seen that there is but one method of fighting the pest, and that is by attacking the cause—the fly itself. By killing it

and preventing it from breeding, it is obvious that at least we may minimise its effects. It is all the more obvious now, when we consider what has been done elsewhere in the direction of killing insects injurious to plant or animal life abroad.

In last month's "Queensland Agricultural Journal" three articles appeared which showed what has been done elsewhere, and which can surely be done here. These articles were by the Assistant State Entomologist, Mr. Jarvis; Mr. A. E. Fisher, of Southbrook; and Mr. Jarrott, manager of Gindie State Farm. Messrs. Jarvis and Fisher both recommend the destruction of the fly, and point out that in America the mosquito pest has been destroyed, and stable flies almost so. Mr. Jarrott points out why the grasshopper plague did not destroy the fruits of twelve months' work at Gindie, and quotes South African methods. There was a periodical visitation of multitudes of grasshoppers there which did enormous damage to the country, and these were stamped out by concerted means, and now South Africa is free from that pest. Therefore, there is nothing left for the sheepowners but concerted action in the direction of killing the fly. There is hope at last that we shall, at least, minimise the evil. It only remains to discover the best means of killing the fly.

In the meantime, palliatives must still be used, such as crutching, dressing, and dipping.

I have before me, by the courtesy of Messrs. Wm. Cooper and Nephews, a most interesting account of over three years' experimentation on Canonbar, New South Wales. Every known dressing was tried on crutched sheep, and the net result was, that bluestone, in the proportion of 2 lb. of bluestone to 4 gallons of soap and water, gives a 98 per centum immunity to ewes after crutching. This is satisfactory enough, but sometimes sheep are blown on the back. In this case, I believe that dipping in a poisonous dip will minimise the effects (even when the animal is struck) of the maggots.

Crutching, to be effective, must be carried well over the tail of the sheep, and properly done; afterwards the bluestone dressing should be applied liberally with a swab over the crutched parts.

The worst method of all is the practice of yarding the sheep every day to crutch and dress sheep as they are struck. Independent of the knocking about the sheep get, the fly can very much more easily reach animals stationary in mobs than if they are roaming about the paddock. I am of opinion that sheep get most of the fly trouble at the bare places around the watering troughs or holes. Besides this, the dusty yards do incalculable damage to the fleeces.

The State might well step in as it has done in South Africa in the case of the grasshopper plague, and abolish a pest which is worse even than the rabbit. The fly is relatively so small as to be difficult to deal with. Josh Billings said, aptly: "It is not the big things which trubble us so much as the small ones. You can dodge an elephant, but you can't dodge a mosquito."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JULY, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Honeycombe	Shorthorn ...	7 June, 1913	1,031	3·8	43·66	
Nellie II. ...	,, ...	5 June ,,	1,026	3·6	41·04	
Gretchen ...	Holstein	19 June ,,	962	3·2	33·94	
Burton's Lady	Shorthorn... ...	23 June ,,	841	3·6	33·64	
Bee	Jersey	7 July ,,	607	4·4	29·98	
Sweet Meadows	,, ...	3 Sept., ,,	310	7·6	27·70	
Cocatina ..	,, ...	19 May ,,	604	3·8	25·57	
Madame Melba	Holstein	22 Jan. ,,	512	4·4	25·28	
Auntie ...	Ayrshire	15 July ,,	588	3·8	24·88	
Davidina ...	,, ...	6 May ,,	549	4·0	24·53	
Lady Twylish	Jersey	14 June ,,	457	4·6	23·64	
Nina ...	Shorthorn... ...	11 May ,,	546	3·8	23·11	
Dilly ...	,, ...	2 June ,,	562	3·6	22·48	
Miss Melba	Holstein	22 Jan. ,,	606	3·2	21·38	
Glen ...	Shorthorn... ...	5 Sept., 1912	372	4·8	20·11	

HAND REARING OF CALVES.

Hand-rearing is adopted by most dairymen in order to procure the best monetary returns, but frequently the calf is the sufferer. A young animal requires natural food for the first few months; consequently it cannot be expected to thrive and keep in good health, when it is fed on separated milk, practically devoid of fat, and frequently more or less contaminated with dirt and its accompanying organisms.

It is most important, for the first two or three days after birth, to give the calf its mother's milk (colostrum); this acts as a natural laxative, which is essential to clear the bowels of fœtal deposits (meconium). Following the first few days the calf should be given about 2 pints of new milk three or four times daily, for at least four weeks, after which skim or separated milk can be given, which is mixed with other foods, such as oatmeal or linseed gruel, the latter making up for the abstracted fat. Usually, when the calf is six weeks old, it begins to pick grass or a little hay, but the skim milk and linseed should be continued until the calf is three or four months old, and always given at about the normal blood heat.

LINSEED JELLY.

Boil slowly, for 3 or 4 hours, 1 lb. of linseed in 3 quarts of water, so that about 2 quarts of jelly or thick fluid remains. Mix about 4 oz. with the separated milk at each meal. Increase quantity as required.

OATMEAL GRUEL.

Mix 1 lb. of oatmeal in 1 gallon of cold water, and then boil; keep well stirred; then allow to simmer over a slow fire until it becomes thick. Allow 4 to 6 oz. with separated milk at each meal.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	June, 1913.	June, 1912.
North Coast.	In.		In.	In.
Atherton	0·54	11	0·85	3·14
Cairns	1·46	25	0·62	8·00
Cardwell	0·7	25	0·55	8·05
Cooktown	1·40	25	0·64	6·03
Herberton	0·45	25	0·72	2·36
Ingham	0·26	20	0·52	13·31
Innisfail	2·41	25	1·84	15·25
Mossman	0·89	5	0·69	8·88
Townsville	...	23	0·54	4·49
Central Coast.				
Ayr	...	25	1·73	6·70
Bowen	...	25	5·42	3·78
Mackay	0·24	25	3·75	5·51
Proserpine	0·1	10	6·69	4·41
St. Lawrence ...	0·20	25	4·82	6·98
South Coast.				
Crohamhurst ...	7·12	20	4·22	9·99
Biggenden	0·68	14	3·68	4·58
Bundaberg	1·26	25	3·45	10·23
Brisbane	2·40	62	4·65	7·27
Childers	1·61	17	3·71	9·68
Esk	1·25	25	4·76	7·43
Gayndah	1·58	25	2·91	4·75
Glass Mount's ...	...	...	...	...
Gympie	3·30	25	5·28	5·07
Kilkivan	0·35	25	4·53	4·96
Maryborough ...	2·26	25	3·48	9·12
South Coast—continued:	In.		In.	In.
Nanango	0·65	25	4·58	6·31
Rockhampton ...	0·33	25	3·55	8·38
Woodford	3·03	25	3·94	9·78
Yandina	6·14	19	4·39	7·42
Darling Downs.				
Dalby	1·05	22	4·17	4·76
Emu Vale	0·32	17	4·47	4·05
Jimbour	0·68	24	4·15	3·99
Miles	0·51	25	4·14	7·70
Stanthorpe ...	1·27	22	3·93	4·67
Toowoomba ...	1·01	22	5·73	6·75
Warwick	0·82	22	3·42	5·69
Maranoa.				
Roma	0·46	21	3·15	7·06
State Farms, &c.				
Gatton College ...	0·44	14	4·69	6·63
Gindie	Nil	13	4·53	9·94
Kamerunga Nurs'y	0·68	23	0·39	...
Kairi	0·38	...	1·01	7·22
Sugar Experiment Station, Mackay	0·58	16	3·83	...
Bungeworgorai ...	0·35	...	2·73	7·06
Warren	0·31	...	3·51	9·51
Hermitage ...	0·62	7	3·96	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

The Horse.

THE HORSE-BREEDING INDUSTRY OF THE WORLD.

Following up our pictorial representations of the stock-raising industries of the world, for which we are indebted to "Die Ernaehrung der Pflanze," Berlin, we now present to our readers, in the same pictorial form, the position of horse-breeding in various countries, the numbers in each being according to the latest returns published in the German Statistical Year Book:—

1.	Russia (1909)	24,803,872	9.	Austria (1910)	1,802,748
2.	United States of America (1912)	20,509,000	10.	Japan (1910)	1,564,643
3.	Argentina (1908) ..	7,531,376	11.	British India (1910) ..	1,556,486
4.	Germany (1907)	4,345,047	12.	Italy (1908)	955,878
5.	France (1910)	3,197,720	13.	Mexico (1902)	859,217
6.	Hungary (1911)	2,350,661	14.	Roumania (1900) ..	864,324
7.	Canada (1911)	2,266,400	15.	New South Wales (1910)	650,636
8	Great Britain and Ireland (1911)	2,243,724	16.	Queensland (1910) ..	*593,813
			17.	Uruguay (1908)	556,307
			18.	Sweden (1910)	586,835

* The Queensland Government Statistician gives the number of horses in the State at the end of 1912 (to July, 1913) as 618,954.

19. Spain (1911)	546,031	25. Finland (1910)	344,108
20. Bulgaria (1905)	538,275	26. Holland (1910)	327,377
21. Denmark (1909)	535,018	27. Belgium (1909)	255,229
22. Victoria (1911)	472,080	28. European Turkey (1908) ..	254,964
23. New Zealand (1911) ..	404,284	29. Cape of Good Hope (1904)	254,389
24. Chile (1911)	431,740	30. South Australia (1910) ..	249,326

A similar pictorial representation of the new German census up to December, 1912, will be shortly published.

Poultry.

OSTRICH FARMING IN QUEENSLAND.

The following notes on the ostrich farm established by Mr. T. Behan, near Jericho, at Garfield, together with the accompanying illustrations, have been supplied by Mr. H. W. Mobsby, artist photographer in the Department of Agriculture and Stock. Mr. Mobsby visited Mr. Behan during July last, and that gentleman gave him full information concerning the birds and their habits, and also enabled him to take the unique set of pictures we publish. Some five years ago Mr. Behan bought a pair of ostriches, which quickly adapted themselves to their new surroundings; and within six months of their arrival fifteen eggs had been laid and ten chicks had been hatched out. It will be remembered that Mr. Behan exhibited his two ostriches some time ago at an Exhibition of the Queensland National Association, from which he had obtained a quantity of excellent plumes. One of these was a particularly handsome, black, upstanding bird; the other being grey.

Two pairs of birds have since been disposed of to the following purchasers:—First pair to Mr. Foster, Boompa (*viâ* Maryborough); second pair to Mr. Sullivan, Crow's Nest. The results of these new establishments will be awaited with much interest.

On Mr. Behan's station there are now (July) 10 chicks, 6 half-grown, and 14 old birds, a total of 30.

The feathers are to be sold at the coming London sales through the agency of Messrs. Hale and Sons. Following are the prices obtained by that firm at a recent sale:—Best white primes, £22 to £33 per lb.; first white primes, £17 to £20; second ditto, £10 to £16; third ditto, £6 to £16; white femina tipped, £4 10s. to £22 10s. per lb.; best black feathers, £3 10s. to £9.

The sales extended over four days, during which the weight of feathers sold was 72,500 lb., mostly from the Cape (of Good Hope), the rest being Egyptian and Queensland. The total amount realised at these sales was £188,000 (as reported in the "Queenslander" of 15th February, 1908).

Mr. Behan's birds averaged 18 oz. at last plucking, some male birds going as high as 27 oz.

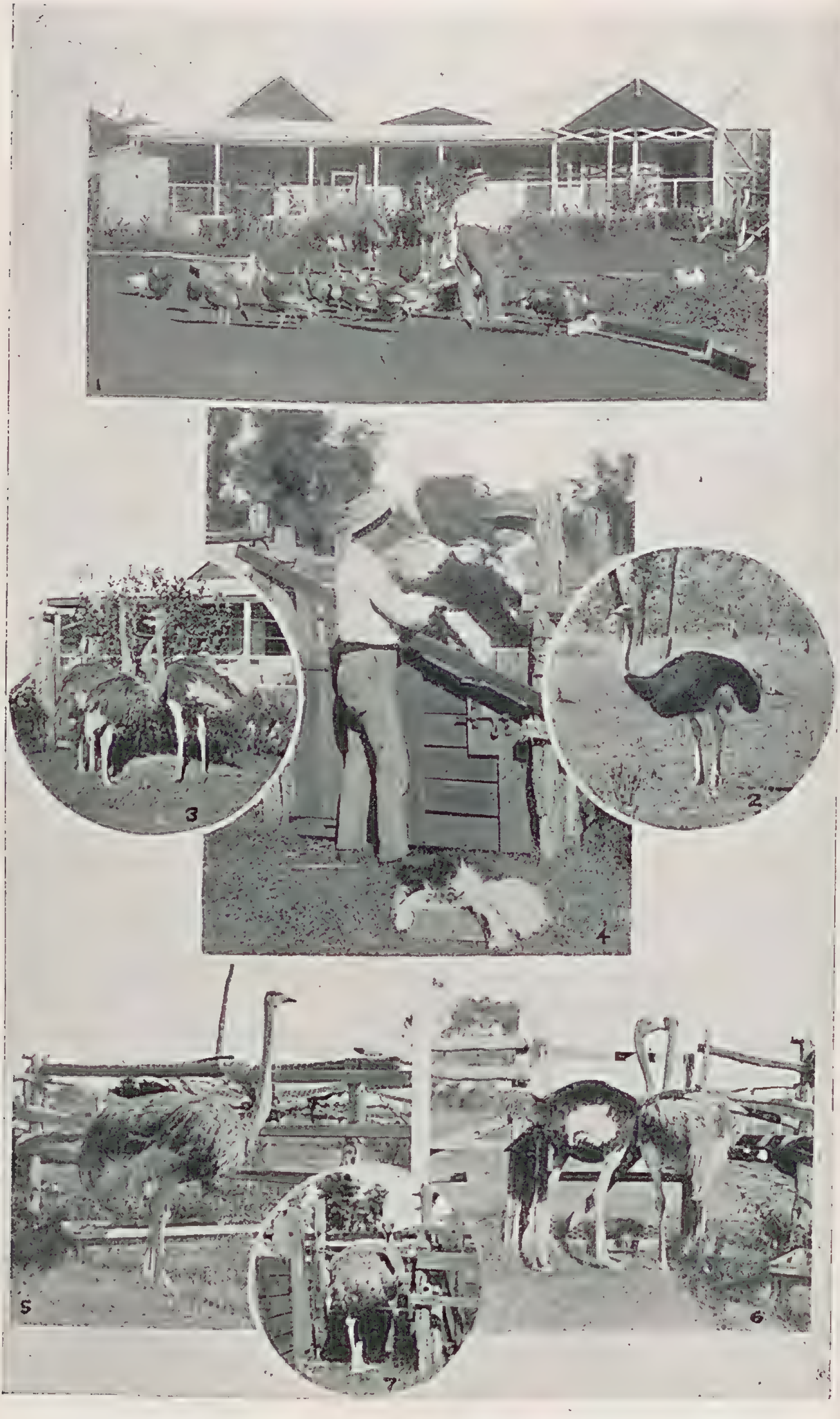


PLATE 115.—OSTRICH FARMING AT GARFIELD STATION, JERICHO.

1. View of station, feeding time. 2. Male bird. 3. Young birds (a trio of). 4. Plucking the bird in crush. 5. Hen bird. 6. A pair of birds in yard. 7. Bird leaving after plucking.

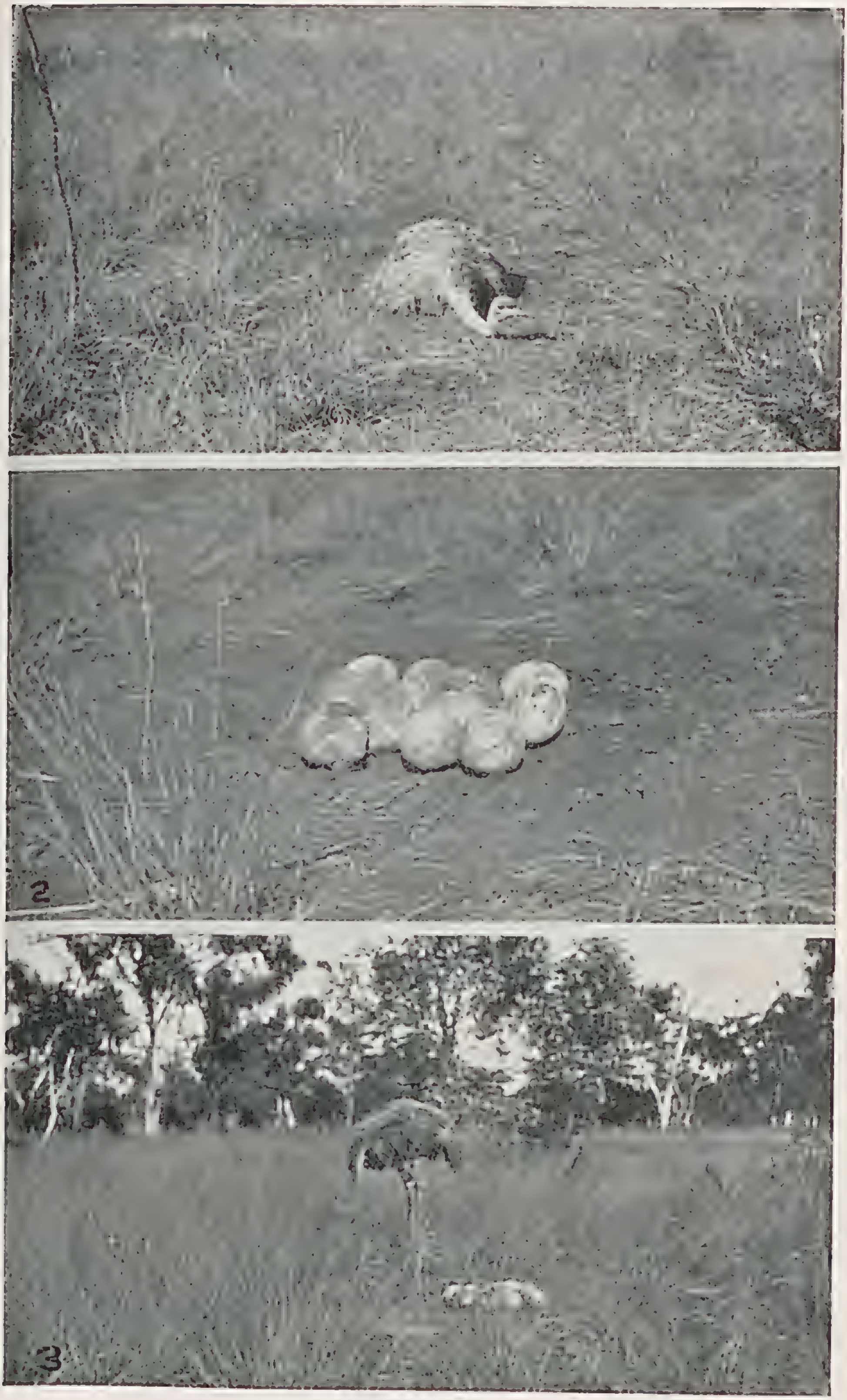


Plate 116.—Ostrich Farming at Garfield Station, Jericho.

1. Hen bird sitting on eggs. 2. Nest, showing eggs. 3. Showing nest and bird.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1913.

Four thousand four hundred and sixty-two eggs were laid during the month. There has been a great improvement in the laying during the last ten days, and most of the birds are now laying well, but there are still individual ones in moult, including two of Mr. Padman's. Mr. Burns wins the monthly prize with 151 eggs (No. 2 pen). The following are the individual records:—

Competitors.	Breed.	July.	Total.
A. H. Padman, S.A.	White Leghorns ...	79	503
J. R. Wilson	Do.	139	491
T. Fanning...	Do. (No. 2)	133	483
O.K. Poultry Yards	Do.	135	479
F. McCauley	Do.	140	462
Loloma Poultry Farm, N.S.W.	Do.	144	458
T. D. England	Do.	141	455
S. E. Sharpe	Do.	146	448
Moritz Bros., S.A.	Do.	127	429
Range Poultry Farm	Do.	147	426
J. Zahl	Do.	116	423
H. Tappenden	Do.	125	413
J. F. Coates	Do.	117	413
Cowan Bros., N.S.W.	Do.	121	410
E. A. Smith	Do. (No. 2)	112	398
R. Burns	Black Orpingtons (No. 2)	151	393
Jas. McKay	White Leghorns ...	102	387
Mrs. Sprengel, N.S.W.	Do.	94	371
J. Gosley	Do.	118	369
R. Jobling, N.S.W.	Do.	97	369
Mrs. J. R. D. Munro	Do.	113	368
R. Burns	Black Orpingtons (No. 1)	132	366
Doyle Bros., N.S.W.	White Leghorns ...	117	364
A. T. Coomber	Do.	114	351
D. Grant	Do.	114	336
A. F. Camkin, N.S.W.	Do.	109	332
Yangarella Poultry Farm	Do.	89	326
W. D. Bradburn, N.S.W.	Do.	98	323
H. Hammill, N.S.W.	Do.	135	316
E. A. Smith	Do. (No 1)	106	310
A. Schbrowski	Brown Leghorns ...	100	306
T. Stephens, N.S.W.	White Leghorns ...	87	276
J. Andersen, Victoria	Red Sussex	97	275
T. Fanning	White Leghorns (No. 1)	125	275
Mrs. Craig	Do.	83	272
C. Leach, N.S.W....	Do.	101	267
J. Archibald, N.S.W.	Do.	84	264
J. Murchie	Brown Leghorns ...	54	254
Mrs. Bieber	Do.	51	205
A. C. Collis, N.S.W.	White Leghorns ...	69	192
Totals	...	4,462	14,558

State Farms.

COW CANE OR INDIAN CANE.

BY ACTING MANAGER, State Nursery, Kamerunga, Cairns.

Although this small cane has been grown for some years as far south as the Richmond and Clarence, it is only, I believe, within about the last two years that it was introduced into this district. The first few plants sent to this Nursery as cow cane showed this cane to be a much larger one than expected, but I find from Mr. Easterby that it is a cane much grown in South Africa, and was originally sent out from the Sugar Experiment Station as a fodder cane, and so, I presume, later got the name of "cow cane" (but not Indian cane). This cane, especially as a ratoon crop, gives a large amount of green fodder, and

PLATE 117.—COW OR INDIAN CANE AT KAMERUNGA STATE NURSERY

appears to be relished by stock. The smaller cane, known as both "Indian cane" and "cow cane," has not attained here the height it is said to grow to. However, as it is only growing in a very medium soil, this would account for it not attaining its maximum height. The photograph shows the larger cane on right and the Indian cane on left; both are plant crops, and the Indian is only little more than half grown. The objection to the Indian cane as found here is, that the dead leaves are hard to trash if the cane is allowed to stand too long. However, there can be no doubt that this cane acts as a good stand-by, and is readily eaten by stock, and a small plot should prove useful to most selectors who do not object to the trouble of cutting and chaffing.—[Why trash? The old trashing business is obsolete—Ed., Q.A.J.]

The Orchard.

CITRUS FRUITS AT BOWEN.

As an illustration of the suitability of the Don Delta lands, in the neighbourhood of Bowen, for the successful cultivation of citrus fruits, we place side by side, for contrast, the orchard "Don Delta Groves," belonging to Messrs. Cotton and Adams, as we saw it in July, 1911, and as it appears in July, 1913. This will enable readers interested in fruit-growing to see at a glance the splendid growth made by the trees during the intervening two years. The plantation consists of 4,000 orange, Emperor mandarin, and lemon trees, which are now coming into full profit. The care bestowed upon the trees in the way of cultivation, irrigation, and pruning has resulted in the establishment of one of the finest citrus orchards in the State. Largely by virtue of the owners' enterprise, Bowen is attracting much attention, having the enviable reputation of being one of the best fruitgrowing centres in the Commonwealth. As a direct result of our previous article on Bowen (July, 1911), a company was formed in England to take up land in the district, and their development operations are now in full swing.

The reasons for the success which has attended the work on the Don Delta Groves plantation are fourfold. In the first place, the site for it was carefully selected, and the rich river silt land gives the perfect drainage so essential to the cultivation of citrus fruits; secondly, catch crops have not been grown in the rows between the trees, hence the fertility of the soil has been reserved entirely for the latter; thirdly, the trees have not been allowed to bear, all fruit being removed almost as soon as found; fourthly, an ideal irrigation plant (standpipe and hose) has provided ample water for each of the 4,000 trees during spells of dry weather.

PREVENTION OF THE GROWTH OF SUCKERS FROM STUMPS.

This is another of those questions which have been frequently answered by us. The best way to effect the destruction of suckers or to prevent their growing is, if the trees are to be ringbarked, to ringbark in a different fashion to the usual method of cutting out a ring of bark and sapwood. Cut straight in for the upper part of the ring, but cut down slantwise at the bottom part, leaving the bark standing up like a fringe, removing, of course, the detached ring of bark. Then, with an oilcan or teapot, pour behind this fringe a small quantity of "Peardoom." Or make a mixture of 1 lb. white arsenic, 1¼ lb. soda crystals, ¼ lb. saltpetre, 1 gallon water, diluted to double the quantity, if necessary. This mixture will destroy not only the trees but the roots, and consequently no suckers will appear.

Plate 118.—Messrs. Cotton and Adams' Orange Plantation, "Don Delta Groves," Bowen, in 1911. Trees, 12 Months Old.

Plate 119.—Messrs. Cotton and Adams' Citrus Plantation, "Don Delta Groves," Bowen, in 1913.

Horticulture.

THE PACKING AND PRESERVING OF SOFT CUTTINGS.

Mr. George W. Oliver, of the Office of Foreign Seed and Plant Introduction, U.S.A. Department of Agriculture, suggests the following method of packing soft cuttings. He says:—It has often been found desirable to bring soft or herbaceous plant cuttings from long distances, but the difficulty heretofore attending their transportation has been that the cuttings do not remain in good condition longer than a day or two. This difficulty has been removed by an exceedingly simple contrivance. Dormant hard-wooded cuttings and scions can be sent long distances by mail, as was demonstrated a few years ago in a collection of scions and bud sticks forwarded to Mr. William S. Lyon, at that time in the service of the Government of the Philippine Islands. Not only did the material reach its destination in good condition, but some of it was repacked according to instructions and returned to Washington, where it was successfully grafted in the greenhouses of the Department of Agriculture. Soft or herbaceous cuttings, on the other hand, such as those of alfalfa, clover, and many other plants, cannot be sent long distances by mail or express, but they will survive a journey of six weeks in perfect condition if kept where they can be given light occasionally and attention is paid to supplying the water lost through evaporation. This treatment in the case of alfalfa and many other plants induces healthy root action during a journey of several weeks' duration.

The apparatus for successfully bringing cuttings of herbaceous plants from distant places is of the simplest nature. The necessary articles are a small quantity of living sphagnum moss, two sheets of strong glass 5 by 7 in. or larger, and some string. The cuttings should be prepared in much the same way as though intended to be placed in a propagating bed. Arrange the first layer of cuttings without too much crowding and with the upper surfaces of the leaves on the first piece of glass and on top of the cuttings, and place about 2 or 3 in. of living sphagnum evenly distributed over the cuttings. Place another layer of cuttings on top of this moss, with the under surfaces of the leaves next to the moss, so that all the available space will be covered; and on top of this second layer of cuttings place the second piece of glass. Press down firmly, remove the moss which protrudes beyond the edges of the glass, and tie together with stout twine. The package now consists of two pieces of glass, 2 in. of pressed sphagnum moss, and two layers of cuttings, one between each piece of glass and the moss. By keeping the moss moist and giving all the light possible (direct sunlight is best, and it does not raise the temperature of the moss to an appreciable extent beyond that of the surrounding atmosphere), the cuttings are not in the least injured, provided the material is free from fungus troubles. If the journey is long enough, say of four to six weeks'

duration, cuttings such as those of clover alfalfa, doryonium, lotus, and many other plants will have rooted freely while closely pressed against the glass. During the time of rooting no attention is required beyond keeping the moss wet and exposing the cuttings to the light for a few hours each day.

With the moss only slightly dampened, scions and bud sticks of rare plants keep a very long time in good condition under the same treatment.

CHARTERS TOWERS FLOWER SHOW.

At the conclusion of the judging at the flower show held in Messrs. Daking Smith and Co.'s premises at Charters Towers on the 18th July last, the judge in the horticultural section, Mr. George Johnson, curator of Lissner Park Botanical Gardens, stated he gave his awards under the rules of the Royal Horticultural Society—rule 80 of which states, as regards vegetables, that quality, coupled with size suitable for table use (in italics), are points of paramount importance in vegetables. Size, much beyond that which invests the produce with the greatest value for table, cannot be regarded as meritorious; as it indicates coarseness, and must therefore be reckoned as a defect. Gigantic vegetables belong to agricultural rather than to horticultural produce. Rule 114: Potatoes, of medium size, free from disease, eyes few and shallow, skins clear, fresh and clean. Points for appearance and freedom from deep or many eyes; uniformity size. Rule 114: Table decorations. No hard and fast rule can be laid down, as table decoration is so entirely a matter of individual taste, but the following are the lines on which judging should proceed:—Lightness and elegance; uniformity of colour or harmonious blendings; beauty of flowers and foliage.

PROTECTION OF PLANTS FROM FROST.

With reference to a criticism on Mr. Welsh's letter, published in the May issue of this journal on the above subject, by Mr. A. H. Holton (July issue), Mr. G. A. Cook, Woowoonga, takes exception to Mr. Holton's statement *re* water expanding in freezing and contracting in thawing. Mr. Cook says: —

"Water contracts in freezing, but the moisture in the air will collect round and upon the frozen surface, and freeze, thereby filling up the contracted space. On the contrary, in thawing, heat is applied, and the heated air expands and bursts the pipe. To prove this, let Mr. Holton take a length of pipe, or, for preference, two lengths, fill them with water, stop up the ends and freeze the water. Then lay one in the shade to thaw of its own accord. With the other, use artificial means for thawing it. I venture to say that this artificial thawing will burst the pipe, whilst the one that was placed in the shade will thaw and remain intact."

Mr. Cook adds that he has been connected with pumping machinery for twenty years in different parts of the world—from the old overshot water-wheel to modern pumping engines; and says that 99 per cent. of the cases of bursting pipes were *due to thawing, not to freezing.*

As regards the freezing of fruit, both tropical and European, he has tried the water on young mango trees and other delicate fruit trees with unfailing success. Banana and other fruit trees, not so treated, suffered and died. Mr. Cook then pertinently asks:—

"Why do people in Canada and North-western America rub a frozen limb of a frost-bitten person with snow to thaw it, instead of thawing it by the fire? It is in order to save it from the bad after-effects. If a limb is thawed before a fire, inflammation quickly sets in, resulting most likely in the loss of the limb and even of life. By the slow, snow process, inflammation is reduced, and the limb and life are saved. Is it not just possible that the water may act as does the snow in remedying the bad effects of the freeze?"

A NEW WEED EXTERMINATOR.

Wild garlic (*Allium vinale*) has for many years been a serious pest in that belt of territory which extends from Maryland to Missouri. Besides having the usual competitive action of a perennating weed, the plant is harmful in that the bulbils on the stem frequently get intermixed with wheat grain and create an objectionable flavour in the flour. As a weed with fodder crops, this plant may have an effect in causing the tainting of milk.

Considerable attention, therefore, has been directed by the Botanical Department of the Indian Experiment Station, towards methods for eradicating this noxious weed. A letter in "Science," for 3rd January, 1913, states that remarkable results have been obtained by the use of orchard-heating oil as supplied by the Standard Oil Company. It was found that when the oil was distributed over the field in a fine spray by a sufficiently powerful spraying machine, practically all vegetation was killed, not only above ground but below ground as well. It destroyed the bulbs of the wild garlic below ground and the bulbils at the top of the stalks. One or two plants with very large horizontal rootstocks survived, since these required a rather large dose of oil than was generally applied.

The application of the oil appeared to have no lasting effects on the soil; the new growth from seeds already present in the soil and from subsequently sown cereals possessed the usual vigour.

In considering the trial of this method in the West Indies for exterminating perennial weeds like devil's grass (*Cynodon dactylon*) and nut-grass (*Cyperus* sp.) the following questions arise:—1. Will the oil actually kill the hardy rhizomes and tubers of these weeds? 2. Does the oil possess any injurious effect regarding the physical and biological characters of the soil? And 3. What would be the cost per acre?—"The Agricultural News."

SUPERIORITY OF TIN CANS OVER POTS FOR SEEDLING PLANTS.

An ingenious investigation into the circumstance, observed in Hawaii, that seedling plants like mango and avocado grow better in tin cans than in earthenware pots, is described by E. V. Wilcox in Press Bulletin No. 41 of the Honolulu Experiment Station.

For the practical propagator the results of the investigation are of very considerable importance, and of a character highly suggestive.

As a working basis it was supposed that the two factors involved were differences in evaporation and stimulation due to tin and solder in the cans. In the course of the experiments it was found that the average evaporation from pots was exactly two and a-half times greater than that from the tin cans, though as might be expected, in sunshine, the relative increase was greater for the tins owing to the more rapid penetration of heat. The soil in a pot was found to be more exposed to evaporation than even the greater surface area would indicate. A more interesting result was the discovery that with the ordinary pot 52.3 per cent. of the evaporation takes place through the top, and 47.7 per cent. through the side. Further determinations showed that the evaporation from a given area is 3.5 times as fast through a free surface of soil as through the side of the pot.

A continuation of the investigation consisted in the growing of seedling plants in pots of varying porosity, and the height and vigour of the plants increased in regular gradations as the porosity diminished. It was next found desirable to determine the loss of water by transpiration.

This was done by the remarkably simple method of subtracting the loss in the tins and pots without plants, from the loss from the tins and pots with plants.

The results showed that the total loss from two months' old plants in pots was approximately the same as that from two months' old plants in tins, the explanation being, of course, that the greater loss by transpiration from the larger and more vigorous plants in the tins balanced the greater loss by evaporation from the soil in the pots. Leaf measurement showed that transpiration was 1.6 times greater in the case of the plants in tins, and therefore they might obviously be considered as growing more vigorously.

The great advantage of using tin cans rather than porous pots seems to rest in the fact that in tins it is easier to maintain a nearly constant moisture content without a rapid drying of the soil about the growing roots which naturally follow the horizontal water movement towards the side of the pot.

Finally, in regard to the influences of the presence of salts of tin and zinc, plants grown in untreated cans did better than those grown in cans of which the internal surfaces had been waxed. This result, together with the fact established, chemically, that very dilute solutions of tin and zinc salts do have a stimulating influence on plant growth, would appear to be good evidence in support of the conjecture that the presence of these salts in the tin can is a second beneficial factor which is absent in the case of its rival the earthenware pot.—"Agricultural News," Barbados.

Tropical Industries.

THE COST OF MAKING COPRA.

The paragraph on page 89 in our ("Tropical Life") May issue, quoting the cost of making copra in Queensland as being £18 a ton (writes the Editor of that journal), caused us to receive several calls, as well as a good many letters, from those either good enough to fall in with our suggestion and give us their estimates for making copra, or from others who wished for further particulars for their own guidance.* As a result of the information received and discussions to date, we have been able to confirm our own opinion that, if copra costs £15, £18, or any other sum c. and f., this amount can roughly be divided into three equal parts. One-third would be taken up in the cost of upkeep of large estates for such areas as are in bearing, provided they were in good order to start with, and needed no exceptional expenditure as heavy weeding or drainage during the year. One-third for picking the nuts and transporting them to the factory, for husking, splitting, removing the meat, drying the copra, and bags and bagging for shipment; whilst the last third goes for transport to the export ship and freight across. For copra to cost £18 a ton, the labour as in Queensland must be excessive, or else the cost would come in the transport to the coast owing to the estate being in a district situated a long way from the seaboard. To our mind, for estates of 3,000 to 5,000 acres or at least 2,000, and the entire area bearing, £15 per ton c. and f. should be, as a rule, a fair average cost for copra, for whether you pay 1s. a day for labour when making the copra, as to some Malays, or about 4d. a day, as with Kaffir or other cheap labour, as in Africa, the cost per ton works out much about the same, a good Malay being equal to three indifferent Africans.

If this is correct, and allowing 2,000 nuts per acre (trees 30 ft. apart) and 6,000 nuts per ton of copra, an estate would cost one-third of £5, or £1 13s. 4d., an acre for general upkeep. If the nuts were so large as to need only 4,000 to make a ton of copra (an estimate that we find too low, especially for large estates of 3,000 acres), then it would be extremely doubtful whether the copra would cost less to produce, as the nuts would only maintain their size owing to better cultivation and liberal manuring, which would run the cost up to 50s. an acre, and hence the same 100s. for the 2 acres necessary to produce 4,000 nuts.

When scientific cultivation, by means of power tractors, ploughs, and cultivators and manure spreaders, supersedes the present low-class labour engaged in "chipping" or hoeing the land, it will be interesting to see how the cost per 100 or 1,000 acres compares with present rates. In Portuguese East Africa "chipping," we are told, costs 5d. per day's task (half an acre), or 10d. per acre. This is done three times a year,

* *See* "Queensland Agricultural Journal" for February, 1913—"Coconuts in the North."

so costs 2s. 6d. an acre, plus the same amount for other expenditure, making 5s. an acre per year for work other than exceptional expenditure. Let us, therefore, work out the cost of a coconut estate of 3,000 acres based on the Portuguese Africa basis; and having done this, we hope others still on the spot, and especially those in Malaya, Mexico, Malabar, Ceylon, &c., will criticise our figures and compare them with their own. A coconut estate, all bearing, of 3,000 acres would need the following labour and expenditure in Portuguese Africa:—

	Per Annum.
1 White manager's (or owner's) time	£800
2 Under-managers at £250 and £200	450
20 Drivers or overseers (equals one to 150 acres) at £5 a month or £60 a year	1,200
200 labourers (1 to 15 acres) with women and children. If there is not one woman and two or three children to each man then 250 labourers (or 1 to 12 acres) at 5s. an acre ..	750
1 White bookkeeper	250
2 Clerks (native) at £100 year	200
Total for upkeep, for labour only, exclusive of manure, machinery, implements, &c., equal to about £1 4s. 4d. an acre	£3,650

This area (3,000 acres) in bearing should give (at 2,000 nuts to the acre, and 6,000 nuts to the ton of copra) 1,000 tons of copra costing £3 13s. 4d. a ton, as above, for upkeep; add another £1 5s. 8d. ton, or £1,350 a year, for renewals of supplies, &c., wear and tear, and sinking fund for labourers' buildings (if any), cultivating implements, and estates supplies, &c., and contingencies, makes the cost of producing 6,000 nuts = 1 ton copra, exactly £5. In the estimate for making the copra must be included depreciation or sinking fund on buildings, machinery (if any), labour, say, 65s. ton, bags and baggings, 10s. ton, plus at least £3,250 interest on capital value of the estate (3,000 acres at £25 = £65,000) = £1 5s. a ton, whilst £4 out of the third £5 would go for transport, freight, &c., and £1 contingencies = £15 ton in all c. and f. Suppose the copra costs £12 only, or £18, then we still suggest that these same three-thirds for estate work, copra-making and interest, transport, and contingencies would remain *pro rata*. In the above we have not calculated anything for coir-fibre or other by-products, nor for catch-crops, either their upkeep or profit, but for cost of producing the coconuts and making and transporting copra only, and that from trees that are practically in *full* bearing.* Now we have made the start and shown our hand, it is up to others to explain where we are wrong, or confirm our statement where we are right. We ask one and all to do so.

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* *See* May issue of "Tropical Life," page 82, as to why the estimate of forty-two nuts per palm fell to only thirty-three nuts, not forty nuts, as we have estimated for, and which is rather a liberal allowance per tree.

The director of the largest plantation coconut concern in Portuguese Africa, if not in the world, maintains, however, that the above figures are much too low, and such an authority as an owner of estates and a large employer of labour is bound to take first rank for consideration. On 14th June last this authority wrote us from Marseilles:—"Your figures are too low; according to our experience, you must reckon for 3,000 acres 300 men during six months for picking and transporting the nuts, 200 men for the same time for opening and drying, 200 men for the other work, as bagging, &c. In all, therefore, you need at least 700 men for six months. Besides this, you must further reckon 300 men for the general upkeep of the estate, tending the land, cattle, &c., draining, removing dead leaves, repairs to bridges, *extermination of pests*" [our friend heavily underlines these three words], "and the other work, as on a farm, and this labour force is required for the whole year." By this one must take it that at least 1,000 men are needed, or one man to 3 acres planted and bearing. The friend who gave us the first set of figures is now in Africa. As soon as he returns we will hear what he has to say and revert to the matter again, probably in August.

ZAPUPE FIBRE.

An account of the then newly discovered indigenous fibre plant, the Zapupe, in the Mexican State of Tamaulipas, by Mr. W. B. Murray, editor and manager of the "Mexican Investor," was published in our issue of December, 1906. Since that time little has been heard of this plant, said to be more valuable than the true Sisal fibre. We find in the "Bulletin of the Imperial Institute" for the quarter January-March, 1913, a reference to the Zapupe fibre, which reads as follows:—

Considerable interest has been taken in recent years in Zapupe fibre, which has been introduced into commerce as a substitute for Sisal hemp. As in the case of the latter fibre, Zapupe is obtained from the leaves of certain species of Agave, but the exact botanical source is unknown. The plant occurs wild in the State of Vera Cruz, Mexico, and has been cultivated in the Canton of Tuxpam, in that State, since about 1901 or 1902. The plant is stated to give better results under varied conditions of soil and climate than Sisal, and, as it requires little attention in cultivation, it seems probable that, once its value is known, its cultivation will be taken up in other countries.

The best situations for the cultivation of Zapupe are gently sloping plains, or the lower slopes of mountains, with a fairly rich soil of not too porous a nature. As the plant is essentially tropical, it will not flourish at high altitudes. It is usually propagated by means of suckers, which are removed from the parent plant when a few inches high, and planted in specially prepared nurseries. After about eight to ten months the plants, now 1 or 2 ft. high, are removed to their permanent quarters and set in rows 7 ft. apart, with a distance of 5 ft. between the plants.

The cutting of the leaves is begun when the plants are four or five years old, and may be continued for a period of about eight or ten years,

when the plant produces a large inflorescence, bearing numerous bulbils, which may be used for propagation. An average of about eighty leaves giving a total yield of about 2½ lb. of fibre, is obtained per annum from each plant in three cuttings.

Two samples of Zapupe fibre have been examined recently at the Imperial Institute, with the results given below:—

No. 1.—This sample consisted of well-cleaned and well-prepared, lustrous fibre, almost white, and of good strength. The length of staple was irregular, in some cases reaching 4 ft. 8 in.

The fibre was analysed with the following results, compared with corresponding figures for Mauritius hemp and for Sisal hemp from the East Africa Protectorate:—

—	Zapupe Fibre.	Mauritius Hemp.	Sisal Hemp.
	Per Cent.	Per Cent.	Per Cent.
Moisture	11·12	13·0	11·1
Ash	1·2	2·5	1·0
A-Hydrolysis, loss	11·8	7·5	11·2
B-Hydrolysis, loss	15·7	18·3	14·1
Acid purification, loss	2·7	2·0	2·3
Cellulose	77·3	76·4	78·2
Length of ultimate fibres	From 0·05 to 0·14 in. aver. 0·094 in.	From 0·05 to 0·15 in.	From 0·06 to 0·16 in.

It is evident from these figures that the Zapupe fibre approximated very closely to Sisal hemp in chemical behaviour and composition, and that it was somewhat superior to the sample of Mauritius hemp with which it is compared, this superiority being shown particularly by the smaller loss on B-hydrolysis (*i.e.*, boiling for one hour with 1 per cent. caustic alkali).

No. 2.—This sample consisted of strong, lustrous, well-cleaned, and well-prepared fibre of rather irregular colour, varying from cream to brownish-yellow, and generally darker than Sample 1. The length of staple was irregular, up to as much as 4 ft. 4 in. This sample was not submitted to chemical examination.

The specimens were submitted to a firm of fibre merchants, who stated that they had not previously seen such good specimens of Zapupe fibre, adding that the samples were of good growth and especially well prepared. They valued No. 1 at about £32 and No. 2 at £30 per ton in London (January, 1913), with Mexican Sisal at £34, and best quality Mauritius hemp at £28 to £30 per ton.

This Zapupe fibre should always be readily saleable in the United Kingdom, but the valuations given above are considerably higher than usual, owing to the recent increase in the price of Sisal and other cordage fibres.

[Full particulars and illustrations of the Zapupe plant are given in the pamphlet on the Sisal Hemp Industry issued by the Department of Agriculture and Stock, Brisbane.—Ed. "Q.A.J."]

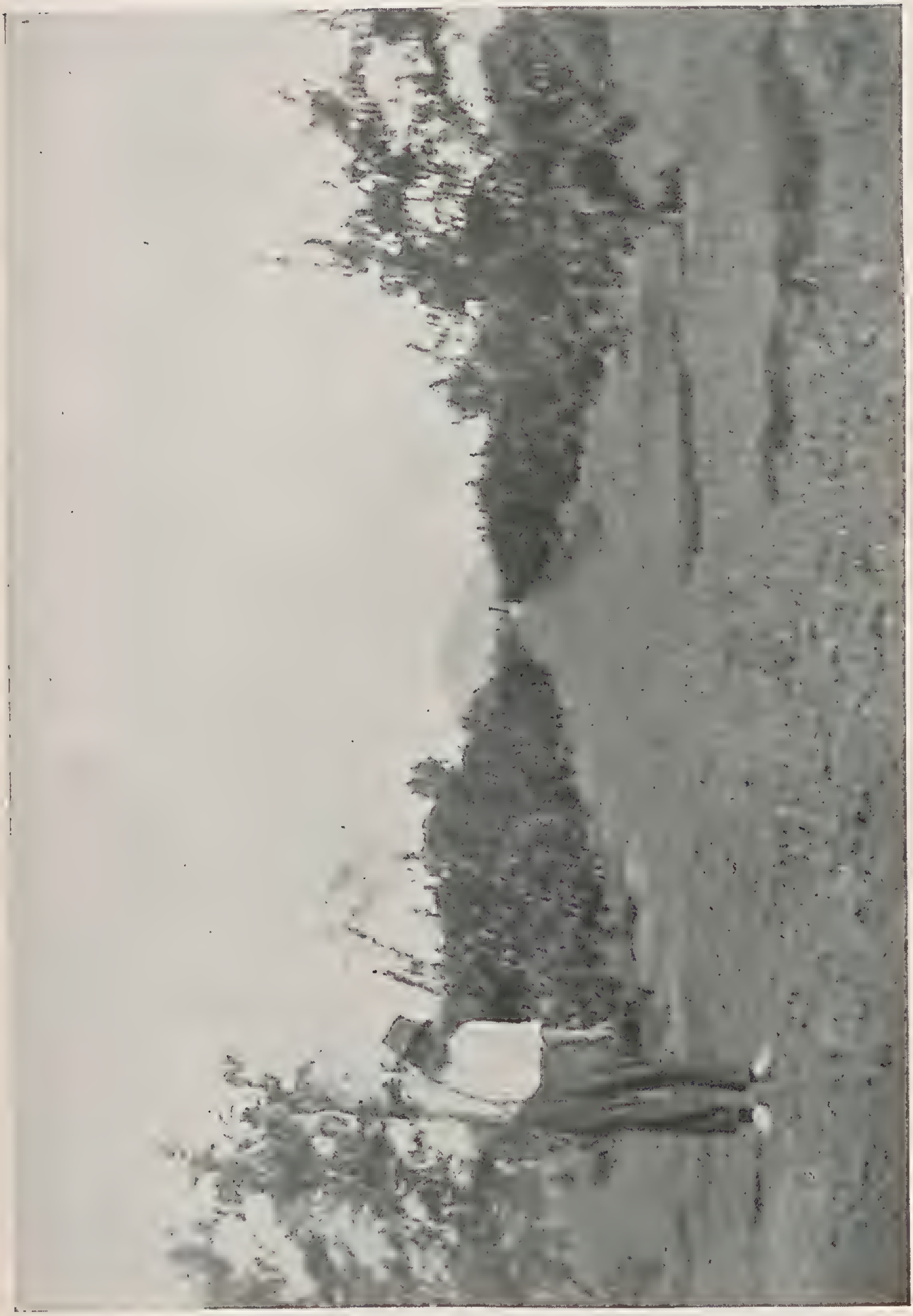

PLATE 120.

FREAK GROWTHS IN BANANAS.

By H. O. NEWPORT, Instructor in Tropical Agriculture.

The Musa family is not one in which freak growths or sporting might ordinarily be expected. Nevertheless, curious and unusual growths do sometimes occur, and on account of their rarity will be of interest to many who are engaged in this industry.

PLATE 121.—CAVENDISH BANANA SPORT.

PLATE 122.—CAVENDISH BANANA SPORT—SIDE VIEW.

Fig. 1 illustrates a sugar banana on which fertilisation of the successive blossoms has taken place a second time in the same flower stalk, after having once ceased and formed the normal bunch. This is by no means new, but is uncommon. The secondary bunch is small, and ripens later than the original and larger bunch, and its existence detracts from its value. The fruit of the later bunch are small and never develop satisfactorily. This instance occurred in the plantation of Mr. T. Butler, Upper Murray, Cardwell district.

Figs. 2 and 3 show a curious premature production by the plant of its flower spike and formation of the fruit. In this case the stem of the

PLATE 123.—SUGAR BANANA WITH DOUBLE BUNCH.

banana plant has split, and the young bunch burst through, and taken shape some 4 ft. from the ground and at least 3 ft. from the head of the plant, which would be its normal position. The variety is the Cavendish, and occurred on the plantation of Mr. P. T. Hogg, at Cardwell.

The writer has met with instances of this premature production of the bunch from the stem in India, where the banana plant was deliberately split open and a small stick inserted to keep the aperture open and admit light and air. The plant does not necessarily suffer if the cut be made above the growing bud. If properly made, the young bud turns out to the light as soon as the split in the stem is reached, and fruit is formed in the usual way. In the instance illustrated no intentional cut was made, and the freak, it is supposed, is due to the splitting of the stem during a cyclonic storm of wind a few months previous. The plant is seemingly quite healthy. The bunch, however, is small and not likely to be of commercial value.

In the former instance the grower has no control over the unusual growth, but in the latter could induce it if he desired, though in neither instance is anything to be gained, as bunches so produced are freaks in the true sense, and do not mature or develop as normally produced bunches do, and are, therefore, of no commercial advantage.

Fig. 4 is a snapshot of a nursery of suckers of the Gros Michel variety of banana from the garden of a white grower near Cardwell.

PLATE 124.—NURSERY OF GROS MICHEL BANANA SUCKERS, FROM THE ORIGINAL PLANTS IMPORTED BY THE DEPARTMENT OF AGRICULTURE AND STOCK.

This grower obtained imported suckers of this variety from the Department, and now, having planted all the area he requires, has suckers to spare, which, instead of wasting, he is keeping for disposal. As the supply from the Departmental institution in the North is unequal to the demand for these suckers, it will be useful to many to know that healthy suckers of good stock may be obtained in reasonable quantity in the North at cheap rates.

The writer will be pleased to put applicants who have as yet been unable to obtain the number they desired in communication with suppliers.

Entomology.

AN ARCH-ENEMY OF THE HOUSE FLY.

Amongst the summer pests of Queensland, the house fly takes a prominent position; and those who have acquaintance with the Western country know what a terrible pest it is in the country districts, causing suffering to human beings as well as to horses and cattle. The following interesting information on a possible destructive enemy of the fly was supplied by the Suva correspondent of the "Sydney Daily Telegraph," last July:—

"The little brown ant has at last come into its own. He has long been looked upon as a curse, but is proving to be a blessing in disguise. The remarkable freedom from house flies in Fiji, at this season, is now understood. The great majority of them are destroyed by the ant while in the egg or larvæ stage. The discovery is of remarkable interest and importance to all tropical countries.

"The scarcity of house flies during the present dry spell has been a matter of common remark in Fiji. The open manure pits, that are to be found on every side, would appear to offer ideal places for the flies to breed, and still very few flies are to be found, even about the stables.

"Dr. J. F. Illingworth, Professor of Entomology in the College of Hawaii, who is visiting the islands in the interests of the Colonial Sugar Refining Company, recently began investigations in Nadi, to ascertain what was holding the flies in check, and if some parasite could be bred, when its great value to mankind would be at once recognised. Early investigations showed that there was a remarkable scarcity of maggots, even in the unprotected manure pits. Ants, being everywhere in abundance, were not taken into account at first. Soon, however, their great numbers over the fresh manure led to closer observations and the discovery that they were carrying the eggs and newly-hatched larvæ of the house flies. The egg or young maggot was held by one end and elevated above the head of the ant while he was making his way over the uneven surface of the manure. It will be easy to understand why this discovery was not made before when we recognise that the egg of the fly is only about 1-25th of an inch in length, and the newly-hatched maggot only slightly larger.

"Further observations revealed the fact that the ants destroy larger maggots of the house fly in great numbers; in some cases even when they have reached full size. The rapid heating of the manure,

or the myriads of mites, which are to be found in the manure irritate the maggots so that they come to the surface from time to time. If they appear among the ants, which are swarming over the surface, they are at once pounced upon, and after a rough and tumble the superior numbers of the ants win the day, and the maggot is dragged off to their nest.

"In one experiment, five full-grown maggots were dropped down among the ants at one time; within twenty minutes the maggots were conquered, and in ten minutes more were being drawn into the nests of ants.

"The wonderful reproductive ability of the house fly, even in cold countries, where they are killed off by the winter, suggests the unthinkable hordes that would plague us in a warm country like Fiji, if they were not held in check. Dr. L. O. Howard, in his volume on the house fly, estimates that one female fly that escapes the winter, laying 120 eggs in April, would result in 5,598,720,000,000 adult flies by 10th September if the conditions were perfect for reproduction. The number is unthinkable, much less can we imagine what the increase would be in a tropical country where breeding goes on the year round.

"The indications are that the little brown ants are the principal factor in the destruction of the great majority of house flies in warm countries."

[It is remarkable that, although we have millions of pestiferous ants —from the great red "soldier" and the "jumper," "bull-dog," and meat ant, to the small, black, red, and brown species—in Queensland, we have not heard that they ever made war upon the eggs or larvæ of the house fly.—Ed. "Q.A.J."]

AUSTRALIA'S PASTORAL AND DAIRYING WEALTH.

In ten years Australia's yield of butter has increased by 92 per cent. Half the annual yield of 193,000,000 lb. is exported.

Every year over 16,000,000 sheep and lambs are slaughtered in Australia for export, and beef totalling over 100,000,000 lb. is sent out annually for oversea consumption.

Australia's wool clip has increased by 33 per cent. during the past five years. The latest "tally" shows that there are over 93,000,000 sheep in Australia, a larger flock than any other country possesses.

Australia's 2,000,000 dairy cows have produced in one year 500,000,000 gallons of milk, from which 193,000,000 lb. of butter, 16,000,000 lb. of cheese, and 12,000,000 lb. of condensed milk were made. There are splendid opportunities for dairy farming in Australia.

Science.

COIR AND JUTE FOR INSULATING CABLES, Etc.

Mr. E. Kilburn Scott, in a paper read before the London Branch of the Association of Mining Electrical Engineers, deals with the use of impregnated jute for the insulation of low-voltage cables. It was, he said, apparently satisfactory, for he had been informed of such a cable in the shaft of one of the Dortmund collieries, 400 metres deep, which had been working satisfactorily for over ten years. Nowadays, jute is used for worming with insulated conductors, for the bedding between lead covering and armour, and for the protective covering outside the armour. The jute is either tarred or impregnated with an insulating and water-resisting compound. The choice between these two methods of treating the fibre depends to some extent on whether the armour is going to be left bright on the outside. If left bright, the jute bedding underneath is tanned; but if the armour is to be treated with impregnated jute outside, then impregnated jute is used inside. The tanning of jute yarn consists in impregnating it with an aqueous solution made with cutch and hot water, but any agent, such as oak bark or sumach, can be used. The effect is similar to that obtained in the tanning of leather—namely, to render it rot proof. When comparing weights of cables it is necessary to remember that if jute is used it may in time become saturated with water and considerably increase in weight. From this point of view, jute is objectionable for shaft cables, especially seeing that at the same time as it becomes heavier it also tends to break down the insulation. It is somewhat strange that jute should be practically the only fibrous material used for cables, because other fibres are available. For example, coir yarn made from the fibres of the coconut is a likely material. Coir yarn is practically incompressible, and is tougher and resists the weather better than any other vegetable fibre, as is well shown by the fact that the main ropes of ships' rigging are frequently made of it. In the loose state it is very much cheaper than jute, and even when plaited, although the plaiting is done by hand, it is also cheaper than manufactured jute. The plaiting is not very even, but that could be overcome. To ascertain the comparative value of coir over jute, tests have been made. After being immersed in water for forty-eight hours, the amount absorbed by a plaited sample of coir was about 20 per cent. less than for jute, and a loose sample of coir absorbed about 15 per cent. less than the jute. After impregnation, the plaited sample appeared to be only 10 per cent. better, but the loose sample was considerably better, in the ratio of 8 to 34.—"Rubber World."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order ORCHIDÆ.

BULBOPHYLLUM, Thouars.

B. aurantiacum, *F. v. M.*, var. **Wattsii,** *Bail.*, n. var. (Plate 126). In both habit and colour of flowers this variety closely resembles the normal form, the distinction being principally in the leaf. Leaves ovate-lanceolate, $1\frac{1}{4}$ to $1\frac{3}{4}$ in. long, $\frac{1}{2}$ to 1 in. broad, and about 1 line thick. Pseudo bulbs a depressed sphere, rugose, embedded in the narrow scales of the creeping stem. Peduncles 1 flowered, sepals 2 lines long, petals minute, labellum more or less obtuse.

Hab.: On trees, Herberton District, *Rev. W. W. Watts.* A fragmentary specimen eceived from L. J. Nugent, in August, 1894, from Freshwater Creek, near Cairns, seems to belong to this new variety.

COBS OF STUD CORN AT WARREN STATE FARM.

PLATE 125

PLATE 126.—BULBOPHYLLUM AURANTIACUM, *F. v. M.* VAR. WATTSII, *Bail. n. var.*
A.—Flower enlarged.

Answers to Correspondents.

SEEDLING CITRUS TREES.

CORRESPONDENT, Strathmore, Surat—

A correspondent writes asking information concerning the length of time required by seedling orange and lemon trees before producing the first crop of fruit. Unfortunately, the writer omitted to send the fourth sheet of his letter on this matter and on prickly-pear extermination, which would have enabled us to identify our correspondent.

WINTER GRASS.

A. G. E., Cloyna, Murgon—

It is too late in the season to plant winter grasses, which should be put in, seasonable conditions permitting, say, in late March or early April. Would suggest "Prairie Grass," sown at the rate of 1 to 1½ bushel per acre, to which may be added 2 lb. of White Dutch clover per acre. We draw A.G.E.'s and "A Subscriber's" (Cloyna) attention to the notice on page VII., "Departmental Announcements," *re* anonymous communications.

LINSEED TEA.

T.E.S., Stanthorpe—

Linseed, six penny worth; liquorice, 1 stick; saltpetre, 2 balls; rainwater, 1 quart. Boil the ingredients until the whole becomes syrupy. Then add six penny worth of essence of aniseed. Strain, and bottle for use.

A MOONLESS MONTH.

AMATEUR, Yandina—

Yes; in the month of February, 1866. That month was in one respect the most remarkable in the world's history. It had no full moon. January had two full moons, and so had March; but February had none. Do you realise what a rare thing in Nature it was? It had not occurred since the creation of the world. And it will not occur again, according to the computation of astronomers, for 2,500,000 years.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1913.

Article.		JULY. Prices.
Bacon, Pineapple	lb.	9d. to 10d.
Bran	ton	£5 10s.
Butter	cwt.	96s. to 108s.
Chaff, Mixed	ton	£4 10s.
Chaff, Oaten (Victorian)	"	£5 to £5 10s.
Chaff, Lucerne	"	£3 to £4 10s.
Chaff, Wheaten	"	£3 10s. to £4 10s.
Cheese	lb.	6¾d. to 8d.
Flour	ton	£9
Hams	lb.	1s. 1d.
Hay, Oaten (Victorian)	ton	£5 15s. to £6 15s.
Hay, Lucerne (Prime)	"	£4 5s. to £4 10s.
Honey	lb.	2¾d. to 3¼d.
Maize	bush.	3s. to 3s. 1d.
Oats	"	...
Onions	ton	£8 10s.
Pollard	"	£5 10s.
Potatoes	"	£4 to £10 10s.
Potatoes, Sweet	cwt.	2s. to 2s. 8d.
Pumpkins	ton	£1 10s. to £2
Wheat, Milling	bush.	3s. 6d. to 3s. 7d.
Eggs	doz.	8d. to 9d.
Fowls	pair	3s. to 4s. 6d.
Geese	"	6s.
Ducks, English	"	3s. to 3s. 6d.
Ducks, Muscovy	"	4s. to 4s. 6d.
Turkeys (Hens)	"	7s.
Turkeys (Gobblers)	"	14s. 6d.

LONDON QUOTATIONS.

American Uplands Cotton (middling)	lb.	6·23½d.
Copra (strong markets) South Sea	ton	£30 12s. 6d. to £31 5s.
Jute	"	£29 to £29 15s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	17s. to 18s.
Bananas (Fiji), G.M., per bunch	6s. to 12s.
Bananas (Fiji) per bunch	4s. to 10s.
Bananas (Fiji) per case	8s. to 8s. 6d.
Mandarins (Queensland), per case	7s. 6d. to 8s. 6d.
Oranges (Queensland), per case	7s. 6d.
Oranges (Queensland) Navel, per case	8s. 6d. to 9s. 6d.
Passion Fruit, per half-case	3s. to 7s. 6d.
Pineapples (common, Ripleys, and Queens), per case	4s. 6d. to 7s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY. Prices.
Apples, Eating (American), per case	6s. 6d. to 10s.
Apples, Cooking (American), per case	6s. to 8s.
Bananas (Cavendish), per dozen	3d. to 5d.
Bananas (Sugar), per dozen	3d. to $4\frac{1}{2}$d.
Cape Gooseberries, per quarter-case	6s. 6d. to 8s. 6d.
Citrons, per cwt.	12s. to 13s.
Cocoanuts, per sack	12s. to 13s.
Custard Apples, per case	4s. 6d. to 5s.
Lemons (Local), per case	3s. 6d. to 5s. 6d.
Limes, per case	4s. to 5s.
Mandarins (Local), per case	4s. to 8s. 6d.
Oranges (Navel), per case	5s. to 6s.
Oranges (other), per case	3s. 6d. to 5s.
Papaw Apples (Local), per quarter-case	9d. to 2s. 6d.
Passion Fruit (Local), per case	5s. to 8s. 6d.
Peanuts, per lb.	3d. to 4d.
Pineapples (Ripley), per dozen	2s. to 3s.
Pineapples (Rough), per dozen	1s. to 2s.
Pineapples (Smooth), per dozen	2s. to 3s. 6d.
Strawberries, per dozen boxes	4s. 6d. to 7s. 3d.
Tomatoes, per quarter-case	3s. to 5s. 3d.

TOP PRICES, ENOGGERA YARDS, JULY, 1913.

Animal.	JULY. Prices.
Bullocks	£8 5s. to £10
Cows	£5 10s. to £7 17s. 6d.
Merino Wethers	28s. 6d.
Crossbred Wethers...	28s. 9d.
Merino Ewes	22s.
Crossbred Ewes	21s.
Lambs	21s.
Pigs (Light Porkers)	31s.

Messrs. Fenwick and Co. report high prices for Australian fur skins. The demand for furs was never stronger than during the present season (1913). Owing to the fact that there has been a close season for opossums and bears for several years, buyers have had to look to other skins to satisfy the demand, and consequently the values realised for small scrub and rock wallaby and other small fur skins are the highest on record. The hight prices have resulted in large numbers of these skins being obtained, but the supply has not yet overtaken the demand. At their sale rooms, Messrs. Fenwick and Co., Edward street, Brisbane, on the 28th July, offered a catalogue of 41,596 skins, which was a record catalogue for this season. Small scrub wallaby realised from 18s. to 30s. per dozen, grey kangaroos to 100s. per dozen, wallaroos to 58s. per dozen, whiptails to 35s. 6d. per dozen. Included in the offerings were a large number of goatskins, and these sold to 48s. per dozen. Station Property Sale: Planet Downs Station, in the Springsure district, has just been sold by Messrs. Fenwick and Co., on account of Messrs. Newman and Logan, to the trustees of the Bell Estate at a satisfactory figure. The station consists of about 700 square miles, and has 13,000 head of cattle and 300 horses.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5 47	4·58	6 5	4·46	6 28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5 35	5 25	5·49	4·56	6·8	4·46	6·31
6	5.58	5·35	5·24	5·49	4·55	6 9	4·46	6 32
7	5·57	5 36	5·22	5·50	4·54	6·9	4·46	6·32
8	5 55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5 54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	5·53	5·38	5 19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5 52	4·52	6·12	4 46	6·35
12	5·51	5·39	5·17	5·53	4·51	6 13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5 49	5·39	5·15	5·54	4·50	6 15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6 15	4·47	6·38
16	5 46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5 41	5·12	5·56	4·49	6·17	4·48	6·39
18	5 44	5·41	5·11	5·56	4·49	6·18	4·48	6 39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6 21	4·50	6·42
23	5·38	5·43	5·6	5.59	4·47	6 22	4 51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4 46	6·24	4·52	6·43
27	5 34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5 31	5·46	5·1	6·3	4·46	6 26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
1 Sept.	●	New Moon	6 38 a.m.
7 ,,	☾	First Quarter	11 6 p.m.
15 ,,	○	Full Moon	10 46 ,,
23 ,,	☽	Last Quarter	10 30 ,,
30 ,,	●	New Moon	2 57 ,,
7 Oct.	☾	First Quarter	11 46 a.m.
15 ,,	○	Full Moon	4 7 p.m.
23 ,,	☽	Last Quarter	8 53 a.m.
30 ,,	●	New Moon	12 29 ,,
6 Nov.	☾	First Quarter	4 34 a.m.
14 ,,	○	Full Moon	9 11 ,,
21 ,,	☽	Last Quarter	5 56 p.m.
28 ,,	●	New Moon	11 41 a.m.
6 Dec.	☾	First Quarter	12 59 a.m.
14 ,,	○	Full Moon	1 0 ,,
21 ,,	☽	Last Quarter	2 16 ,,
28 ,,	●	New Moon	12 59 ,,

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. See our instructions in "The Sisal Industry in Queensland," obtainable free by intending planters on application to the Under Secretary, Department of Agriculture and Stock. Plant only on dry or well-drained soil. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The

principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tube-rose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahliah, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if

fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. OCTOBER, 1913. PART 4.

Agriculture.

EXPLOSIVES IN AGRICULTURE.

BY F. R. TRELEAVEN, New Farm, Brisbane.

From a thorough study of the above and experiments carried out covering a period of the past eleven years, I have formed the decided opinion that explosives have come to stay, and play a most important part throughout the agricultural world—a fact which the farmers of Queensland should not overlook; the aim being to combine efficiency with economy in bringing explosives into use in land-clearing, and thereby making a saving of from 40 to 50 per cent. as against hand labour, and it has been proved in many cases that a saving of from 100 to 200 per cent. has been accomplished. The efficiency of explosives on the land I have thoroughly tested, and successfully demonstrated as to their value on sub-soiling (a most important part), the splitting of logs for burning and fencing purposes, the cutting through of logs for rolling together to burn, the cutting of waterways, and the draining of land in letting through surface water where practicable.

The first consideration for the farmer is the removal of standing timber and stumps, so that the plough may be brought into use and enable him to get returns as expeditiously as possible at the least cost; and this can be accomplished with the aid of explosives, thus saving a great deal of hard labour.

KINDS OF EXPLOSIVES.

There are different kinds of explosives that are brought into prominence in land-clearing, all of which have their merits more or less; and I may say that I have demonstrated practically with all of them, and it rests with the user to decide which particular ones he should make a careful study of, that he may get the best results at the least cost. For myself, I use both nitro-glycerine and chlorate compounds. It all depends on the nature of the timber and soil, if wet or dry, and, by combining both with careful study and results obtained, one gets very near the mark, but to judge to a plug or two in heavy shooting is out of the question—experience teaches. The tools I use consist of a $\frac{7}{8}$-in. steel bar drill, chisel-pointed at one end and diamond-pointed at the other, a draining spade, and a wooden rammer for tamping with earth. If blasting with gelatine or gelignite, I use water tamping—that is, if it is near at hand and the ground will hold it, which it will do sufficiently long enough if the timber is green, but should the timber be dry the water tamping gets away more rapidly should the soil be of a soft nature.

In stumping with gelignite or blasting gelatine, take, for instance, a stump 4 ft. in diameter. It may be necessary to make from three to four or six holes under the main roots—that is, to make a clean job of it—and distribute the charges according to size of roots. Should the stumps have a tap root, there is no necessity to bore into it with an auger, that the root may be broken off, as it can be cut off with the explosive, thus saving labour. The experience I have gained in stumping with explosives enables me to see where the charges should be placed under the stump, and to get at this I use the draining spade and small bar. The holes may be from 4 in. to 6 in. in diameter, so that you can see where a charge is going to; whereas, by the method of boring under stumps with the auger, one is working in the dark; and another disadvantage is, the explosives placed in the auger-hole do not get the opportunity of doing their work effectually.

STUMPING WITH RACKAROCK.

This may be effectually carried out with one hole only, with the charge placed under the centre, this being the main point. The rending power of chlorate explosives is far greater in heavy shooting than that of nitro-glycerine explosives, for the reason that chlorate explosives retain their energy for a longer period.

METHODS OF FIRING.

There are two methods of exploding charges: First, with a safety fuse; and the other by electricity. The first may be adopted where only one shot is necessary; but where more charges are required, and these distributed under a stump and fired simultaneously, the electric fuses and battery are used. This method of firing causes no misfires, providing the connections are perfect.

SAFETY FUSE.

A good fuse should be reliable. It may be set down at as burning at the rate of 2 ft. a minute, which allows the operator to retire to a safe distance. In preparing the charge, tie the plugs together. Take the detonator and shake all sawdust out of it, for if this is not done a misfire might occur, and even if this does not happen there is a possibility of the sawdust smouldering, in consequence of which there may probably be an accident. In inserting the fuse into the detonator, cut the fuse straight across; and in starting on a new coil, cut a few inches off before use. In crimping the detonator on the fuse, use proper pliers designed for the purpose. When firing in water, make the cap water-tight by smearing brown soap or fat around the neck of the cap. When inserting the fuse into the detonator, do so carefully; likewise when fixing the detonator into the primer, and don't press home on the fuse. Hold the top of the cap, and tie it firmly into the primer; otherwise it may come adrift in the tamping. Don't turn the fuse along the side of the charge, as it may or may not cause the charge to start burning. The length of fuse required may be cut off after the tamping is completed. Use a piece of stick in making a hole in the primer to receive the detonator. In handling explosives, treat them as such, and go about the work quietly, remembering that the best results are obtained by sound judgment.

FIRING BY ELECTRICITY.

Those who intend to work with explosives should procure an electric outfit, as it renders the work practically safe as far as it is possible to do so. The outfit is the following:—

A magneto exploder;
Electric fuses (low tension);
Insulated cable; and
Connecting wire.

BLASTING TREES.

In blasting trees, do so, if possible, on a windy day, trusting to the wind to drag out some of the roots, thereby saving explosives. To clear country economically, make good use of fires if the tree is dead, and should it not fall, a fire will bring it down before morning, and some trees usually burn well standing. The same applies to stumps. Don't shoot them right out of the ground, but just give them sufficient to lift them, say, 18 in. to 2 ft., splitting them in halves or quarters. Then the fire will do the rest, and save a lot of snigging, which would be necessary if stumps were blown all over the place. Explosives cost money, but, used as they should be used, they save money and time and bring quick returns from the land.

LOG SPLITTING AND CUTTING OFF.

The only tool necessary is a 1½-in. auger for logs up to 4 ft. in diameter, using gelignite or blasting gelatine. Holes from 8 to 12 ft.

apart are bored on to the centre from the top of the log. This refers to clean running timber, giving each hole two plugs. Should the timber be hard and curly, use a 2¼-in. auger, and bore to a depth just beyond the centre of the log, so that the charge, when placed, will be in the exact centre of the log. This auger-hole will take five plugs of 1-in. gelignite, side by side, which is sufficient to cut the log through; and the lengths so cut off may be rolled together for burning. A complete outfit of augers for the above work would be—one each of 1½ in., 1¾ in., 2¼ in., using your own judgment, according to size of timber, as to which auger to cut off with. The cutting off can be done with ordinary fuse. For splitting use the battery on the line of holes along the log.

SUBSOILING.

This is a most important part that explosives play for the benefit of the farmer. The cost is a mere bagatelle in view of increased crops. Subsoiling should not be attempted when the ground is wet—take the dry weather for it. In damp ground and in certain soils, the explosive tends to harden and pug the soil where the explosive has spent its energy on the outside limit; whereas in dry ground the force of the blast runs out a greater distance, and loosens up on a nice even basis. The depth of the holes varies from 2 ft. 6 in. to 1½ ft., according to "the nature of the soil." This also applies to the distance the shots should be apart, which may vary from 7 to 18 ft., and the quantity of explosive used may be from a half to two plugs, say, of gelignite. A farmer, in subsoiling, should take the class of explosive he intends to use, make two or three trial shots, and then use the crowbar adjacent to the explosion, which will give him a good idea of the distance to which the charge has penetrated. Don't expect to see a great upheaval of the soil. This is not what is required. The ground should have the appearance of having been on the boil, and thus settled and shaken up. This is what is required; so study the subsoil, which is the home of the roots and the source of plant food. Farmers should not get the idea that their farms are impoverished through years of cropping, for they have only scratched the surface soil by ploughing. Country that has been under crop for twenty years can practically be restored to its virgin state with the aid of explosives; so do not dispose of the farm with the idea that you have taken all the good out of the land. It is far from it. Subsoiling means—

The utilising of the fertilising elements of the subsoil;
Storage of rainfall in the subsoil;
Good drainage;
Atmospheric influences penetrate the subsoil;
The roots obtain their nourishment from it;
Destruction of field mice, &c.;
Advantage of getting sooner on to the land for cultivation; and
Bountiful crops.

EXPLOSIVES IN AGRICULTURE.

[Extract from a Paper by H. C. Coggins, in the "Agricultural Gazette of New South Wales."]

It is remarkable that, of many trials made in Queensland for the removal of trees and stumps and for subsoiling by the use of explosives, none or very few appear to have been successful. The latest report we had from an experimenter was that he had placed 31 dynamite cartridges under a stump of no great dimensions and had exploded them without the slightest effect on the stump! Another informed us that he had charged a line of holes with a view to subsoiling the ground. In this case the holes had merely acted as gun barrels; the surrounding soil was neither shattered nor even crushed. In other States the experiments appear to be successful almost everywhere, as will be seen by the following instances recorded in "Garden and Field," an excellent and reliable journal published in Adelaide: —

A demonstration of the usefulness of explosives for removing trees and stumps, ditching, and subsoiling was given at Mount Barker recently. The test was reported in the "Advertiser" (S.A.) as follows:—The first stump chosen was a pine of about 30 years' growth. Evidently the soil and climate are eminently suited for the growing of pines, for this stump, 2 ft. above the ground, was 10 ft. in circumference. A hole was bored in the ground towards the tap root with a 2-in. auger, and 30 plugs of gelignite were inserted and fired. This was repeated on the other side of the stump, and, although the earth was removed from underneath, the tentacle-like roots still held the stump in place. These roots, which ran almost horizontally from the stump, were then operated on. With a 1-in. auger a hole was bored into each root, and one plug of gelignite was placed in each hole; then all were simultaneously fired. Upon examination every root was found to be completely severed, leaving the stump ready to be hauled. The next stump was about the same size, but the experience gained in the first saved money in the second. In this case the operations were reversed; the tentacles were cut by gelignite, then three holes under the stumps were charged and fired simultaneously. Spectacularly and financially, the effect was grand. One portion of the stump, weighing over 2 cwt., was blown at least 50 ft. into the air and fell 120 ft. from the place of explosion, the rest of the stump being removed many feet.

The unbelievers were completely won over by the signal success of this experiment. The whole cost for gelignite, fuse, detonators, and time was as near as possible 7s. The general opinion among the onlookers was that the stumps would have taken one man one and a-half day to grub. A blackwood tree, 25 ft. high and 50 in. in circumference, was blown out of the ground, after about 10 minutes' work, at a total cost of 2s. The effect was then shown on growing red gum trees, ranging from 45 ft. to 63 ft. in height and from 4 ft. 6 in. to 7 ft. 6in. in circumference. It was surprising how quickly, simply, and cheaply these trees were taken out. The preparations for the largest of these gums took only 10 minutes, and at a cost of 3s. the job was done. The smaller trees took about the same time for preparation, but the cost in each case was lessened by 6d. to 9d. per tree.

For ditching, dam-sinking, and general excavation work, explosives must in the near future be very greatly used. The holes for the ditching experiment were prepared by novices, but were not properly placed. The proper position is zigzag fashion, the holes to be 2 ft. apart in a straight line. A plug of gelignite was inserted in each hole and fired. The explosions caused the ground to fly, and, as a result, all along the line of fire it was broken up to a depth of 3ft. or more, making the removal of the loosened earth a matter of simplicity.

For subsoiling proper, a new powder of Australian manufacture was used. This was fired by means of a primer in the shape of a third of a plug of gelignite with the detonator. The holes were bored 2 ft. deep and 10 ft. apart, and the charge inserted and fired. Little result was apparent on the surface (except in the case of one hole, where a double charge was placed for experiments); but below, the ground was broken in all directions, the cracks extending from one hole to the other. At the actual spot of the explosion a spade could be driven down to the handle. For those who contemplate planting trees of any kind, roses or shrubs, preparation of this nature is advised for three reasons—viz., time saved, money saved, and the roots of trees or shrubs get no check in their growth.

Again, in the May issue of the "Agricultural Gazette" of New South Wales, at the conclusion of a paper on "Subsoiling by Explosives," by H. C. Coggins, we find the following remarks and advice on the method:—

When one is asked to consider any new proposition appertaining to farming, the first thought is: What is it going to cost? This most important item I shall deal with later, except for saying here that I have carried out a number of demonstrations in subsoiling with explosives in different parts of the State, and on different soils, and I find that subsoiling with explosives is by far the cheapest and best. One man can do the whole of the work; no horse and plough are required, only a few tools, consisting of one 2-in. bullnosed auger, one tamping rod, and one pointed crowbar.

The explosive I use and would recommend is gelignite or blasting gelignite; it is handy, less dangerous, and not expensive.

In deciding to subsoil a paddock, the strength of the ground must first be ascertained, and a test hole is put down, about 2 ft., to get this. One must not expect to see an upheaval; this is far from what is required. If the earth is displaced to any extent, it shows that the charge is too strong and is liable to bring the subsoil to the surface; this must be avoided. As a general rule, I test with one plug, and usually I find this sufficient for good work. Of course, some soils required only half a plug; it all depends on the nature and strength of the subsoil and hard-pan.

After getting the strength of the ground, go ahead; bore the holes every 10, 15, or 20 ft. apart, according to the strength of the subsoil, and about 2 ft. or 3 ft. deep.

PREPARING THE CHARGES.

In preparing the charges, it is necessary to use ordinary care and common sense; otherwise they may hurt. In cutting the fuse, cut square across the face, not slanting, and allow about 4 in. to project above the ground; insert the fuse into the detonator, making quite certain that no sawdust packing remains in the cap. Be careful not to push the fuse well home. Leave a space between the conical-shaped cap, which contains fulminate of mercury, and the end of the fuse. Crimp the detonator on to the fuse at the end of the cap, and use the proper crimper for this purpose. Do not bite it on; it might bite you.

Gelignite is in a soft condition like soap. Bore a hole in it with the handle of the crimper, specially designed for the purpose; insert the detonator and tie the end, paper and all. This keeps the cap from slipping out. Lower the charge into the hole; tamp gently at first, but more strongly as the surface is reached, making the hole compact and tight, which is very important to get a good result. Then cut the fuse in a slanting direction and insert a small piece of gelignite. This will save matches and temper, if there should be any wind about.

As the fuse burns at the rate of 30 in. a minute, there is plenty of time to stand back. If one man is doing the job, it is advisable not to charge and fire more than 25 shots at a time; otherwise he may lose sight of a possible misfire.

EFFECT OF THE EXPLOSION.

There will not be a big report, as some expect; neither will there be a displacement to any extent of the top soil. Where a number of holes are fired together, the effect for a fraction of a second resembles porridge on the boil.

The vibration of the shot will be felt from 10 to 15 ft. away, and this is practically the distance shattering of the subsoil extends. If one could take a section of the ground, the fractures could be easily seen.

THE COST.

The following table will give some idea of the cost of subsoiling with explosives. I do not include labour, as this will depend on the rate paid and also on the strength of the ground. Where conditions are easy, a hole a minute should be done; but where the hard-pan is tough and the subsoil very compact, it may take 5 minutes. Preparing the charges and tamping the holes will take nearly 4 minutes per hole.

DONT'S.

There are several " Dont's " to be observed, and it may be well to note a few:—

1. Don't smoke on the job.
2. Don't tamp with a metal tamper; use a wooden one—a broom-handle is excellent.
3. Don't tamp hard at first.

4. Don't, in the event of a misfire, untamp the hole, but put down another hole about 1 ft. away.
5. Don't forget that you are using explosives, and get careless after firing a few shots.
6. Don't clinch the cap on to the fuse with the teeth.

I would advise intending subsoilers, if they have not had previous experience, to attend one of the demonstrations that are given from time to time by the department, under the auspices of the various branches of the Agricultural Bureau, for, although the method is not difficult, ocular demonstration is always better than printed instructions.

Dry weather is the best time. Results are better then. When the soil is wet, the subsoil is liable to pug, and, instead of shattering downwards and outwards, the explosive is liable to have an upward effect.

ADVANTAGES OF SUBSOILING.

Some of the great advantages of subsoiling land are—

1. Conservation of the rainfall in the subsoil.
2. The drainage will be far more satisfactory.
3. It is possible to get on the land quicker after rain.
4. Air and atmospheric heat can get to the subsoil and sweeten it up.
5. Roots of all crops are encouraged to go down, instead of spreading unnecessarily near the surface.

TABLE SHOWING COST OF SUBSOILING WITH EXPLOSIVES.

Distance of Holes Apart.	Charge.	Number of Holes per Acre.	Number of Lb. per Acre.	Number of Feet of Fuse per Acre in 3-ft. holes.	Number of Detonators per Acre.	Total Cost per Acre.
Feet.	Plug.					£ s. d.
10	½	435	21¾	1,305	435	2 12 9
10	1	435	43½	1,305	435	3 14 6
12	½	302	15	906	302	1 16 6
12	1	302	30	906	302	2 11 6
15	½	194	10	582	194	1 3 10
15	1	194	20	582	194	1 13 11
18	½	128	6¼	384	128	0 15 4
18	1	128	12½	384	128	1 0 7
20	½	109	5	327	109	0 12 9
20	1	109	10¼	327	109	0 18 0

[Surely, what some men have done, others can do. Whence, then, do all our failures in Queensland arise?—Ed. "Q.A.J."]

AMOUNT OF WATER NEEDED FOR IRRIGATION.*

The amount of water needed for irrigation varies within wide limits, being affected by the climate, weather, kind of soil, variety of crop, manner of application of the water, and by the character of cultivation which the field receives subsequent to irrigation.

* Extract from "Irrigation in Humid Climates," by F. H. King. Farmers' Bulletin No. 46, U.S. Department of Agriculture.

Let us first consider the amount needed for a single watering. This must be determined by the amount of water the soil contains at the time it is to be irrigated and by the amount it should contain in order that plants may do their work to the best advantage.

The maximum capacity of upland field soils for water ranges from about 18 per cent. of their dry weight for the light sandy types to about 30 per cent. for the heavy clayey varieties, while the amounts of water these soils should contain in order that plants may thrive in them best is from 12 to 14 per cent. for the former and from 18 to 20 per cent. for the latter. The growth of plants will be seriously checked in sandy soils when the water content falls below 8 per cent., and in heavy, clayey types when it falls below 14 per cent. of the dry weight of the soil.

The dry weight of a light sandy soil and subsoil will average about 105 lb. per cubic foot, and the heavy, clayey type about 80 lb. per cubic foot. Hence the maximum amount of water per cubic foot of soil would be about 24 lb. for the clay and 18·9 lb. for the sand. This being true, 4·6 in. of water on the level would completely saturate the surface foot of heavy clay soil were it entirely dry to begin with, while 3·6 in. would place the sandy soil in a similar condition.

But, since water should be applied as soon as the water content of the sandy soil falls to 8 per cent. and that of the clayey soil to 14 per cent., it follows that under these conditions 10·5 lb. of water, or 2 in., is the maximum amount which would be needed to fill the surface foot of sandy soil and 12·8 lb., or 2·46 in., is enough to fill the surface foot of clay soil.

If we consider the second foot of soil to have been dried out to a corresponding extent, and that it is desirable to saturate this with water also, then the amounts just stated would need to be doubled, 4 in. being demanded for the sandy soil and 4·92 in. for the clayey soil. It is quite certain, however, that such an application of water to a field at one time would result in the percolation of a considerable amount of this water below the depth of root action, and hence in a considerable loss of it unless a large crop were growing upon the land at the time. It appears, therefore, that the amounts of water which may be applied to a field at one time will lie between 2 and 5 in. in depth over its whole surface.

How often this watering may need to be repeated it is not possible to state in anything like definite terms, but practical experience shows that, as a rough average, the intervals between watering where maximum yields are sought cannot much exceed 7 to 14 days, the time being shortest when the crop is making its most vigorous growth.

In experiments at the Wisconsin Station during 1895 corn was irrigated once about every 7 to 9 days, applying at each time 4·43 in. of water. The corn, however, was planted very thickly upon the ground, the rows being only 30 in. apart and the hills 15 in. apart in the row, with from 2 to 5 stalks in each hill. The first irrigation was given 26th June, and the last 15th August, the total amount of water applied being 26·6 in. The yield produced was 11,125 lb. of water-free substance per acre.

In the case of the water meadows of Europe very little attention is paid to the natural rainfall, the irrigation waters being applied whenever it is possible to do so, and whatever rains fall are counted as so much additional gain. It is true, however, that on most lands with crops other than grass, attention would have to be given to the natural rainfall in the application of water by irrigation, lest oversaturation of the soil and a positive waste of water should occur.

If it is regarded that ample irrigation has been provided when 2 in. of water is supplied every 10 days as a minimum and 4 in. as a maximum, then, to meet this demand, there would be required for 1 acre a continuous flow of water at the rate of 0·5042 cubic foot or 3·77 gallons per minute for 2 in., and 1·008 cubic foot or 7·54 gallons per minute for 4 in. An area of 10 acres would require a rate of flow ten times as rapid, or 5·04 cubic feet per minute for the minimum and 10·08 for the maximum.

These amounts of water expressed in cubic feet and in gallons are as follow:—

	Cubic feet.		Gallons.
For 1 acre 2 in. deep ..	7,260	=	54,310
For 1 acre 4 in. deep ..	14,520	=	108,620
For 10 acres 2 in. deep ..	72,600	=	543,100
For 10 acres 4 in. deep ..	145,200	=	1,086,200

If these amounts of water are stored in circular reservoirs with vertical sides and 3 ft. deep, their diameters will be, respectively, 55·5 ft., 78·6 ft., 175·5 ft., and 248·5 ft.

MILLETS.

By G. B. BROOKS, Instructor in Agriculture.

A considerable amount of interest was manifested in the samples of fodder crops shown in the travelling exhibit displayed at the various shows.

Although many inquiries were made regarding winter crops such as cereals, the information mostly desired was in connection with summer-growing plants, more particularly the panicums and millets.

It may be mentioned that the term "millet" embraces a number of plants very unlike botanically but all belonging to the grass family. Several of those grown are simply improved forms of our native grasses.

In the older settled districts the common panicum or setaria has been grown for many years. Recently, however, this has been to a large extent superseded by several new and more useful varieties.

Unfortunately, in several localities the names of those recently introduced have got mixed up, resulting in many instances in considerable loss to the grower. For instance, a farmer asks me to recommend a variety suitable for hay; on suggesting a trial of White Panicum, he states that this sort has already been grown in the district, but found unsuitable; on investigation, it is found that what he knows as White Panicum is really Japanese Millet.

The accompanying illustrations, together with a short description, are intended to show the various forms and characteristics of those most suitable for fodder purposes.

Plate 127.

1. White Panicum. (*P. frumentaceum.*) 2. Japanese Millet. (*P. Crusgalli.*) 3. Three Wild Forms of *P. Crusgalli.*

WHITE PANICUM (*PANICUM FRUMENTACEUM*).

Both in regard to yield and quality of cured material, this variety is undoubtedly the most promising, although a rank grower and apparently coarse in the stalks, yet when harvested at the proper time it cuts up into a soft, bright-coloured nutritious chaff. It is a good crop for ensilage, and can also be used for grazing purposes.

White Panicum may be said to be the most tropical or "heat-loving" of all varieties. Very early or very late planting should, therefore, be avoided. In the coastal belt, or under tropical conditions, sow from October to the end of February; on the Downs and South-western districts, from November to beginning of February. Under ordinary conditions, 15 lb. of seed will be ample to sow an acre. An average crop will yield from 3 to 4 tons of hay per acre and from 12 to 14 tons of green material. In colour the seed is a dull white, and generally free from the husk.

JAPANESE MILLET (*PANICUM CRUSGALLI*).

This variety is known in several districts as "White Panicum." The seed is, however, much darker in colour and invariably carries the husk. It is also much more quickly maturing in habit, and can be sown either earlier or later in the season than the white variety. Sowings can be made on the coast and in the North from September to the end of February; on the Downs, from October to beginning of February; quantity of seed per acre—for hay, 15 lb.; for ensilage, 12 lb.

Owing to the stalks being coarse and hard, it makes a rather poor-quality hay or chaff. If intended for such, harvest as soon as the seed head appears. It is very suitable for ensilage, and several Downs farmers report that it stands grazing well. An average crop will give 2 to 3 tons of hay per acre and 8 to 9 tons green stuff.

COMMON PANICUM.

The varieties cultivated under the name of "Common Panicum" are *Setaria Italica* (Hungarian Millet) and *Setaria Italica,* var. *Germanica* (German Millet). Both sorts are so well known that any remarks in regard to such are unnecessary. In the majority of cases those kinds are allowed to get over-matured when cut for hay. If taken at the proper time and well cured, a good-quality hay or chaff will be the result.

Season to plant and amount of seed, same as recommended for Japanese Millet.

MANCHURIAN MILLETS (*SIAO-MI:* LITTLE SEED).

There are two varieties of above, but, as far as I am aware, they have not been botanically classified. They are simply known as "White" and "Yellow" according to the colour of their respective seeds. During the past few years they have been grown in several localities, but only in very limited areas. Both varieties produce an exceptionally heavy seed head, for the support of which a strong fibrous stalk is essential which renders them unsuitable for the making of a good-quality hay. They would, however, provide material for ensilage, and would also be worth raising as a grain crop for the feeding of fowls, &c.

Plate 128.—Forms of Common Panicums.

1. Hungarian Millet. (*Setaria Italica.*)

2. German Millet. (*Panicum Germanicum.*)

Plate 129.—Two Forms of Manchurian Millets.

1. Hsiao-mi (Yellow). 2. Hsiao-mi (White).

FRENCH MILLET (*PANICUM MILIACEUM*).

This variety is considered to be the earliest of all cultivated millets, there being historical evidence of its being cultivated in China 2,800 years before the Christian era.

Plate 130.—French Millet (*Panicum miliaceum*).

This is probably the earliest maturing of all cultivated millets, invariably ripening seed in some seven weeks. In several instances I have secured a good crop of seed in five weeks from time of planting.

This variety is not recommended for hay, being very short in the straw. Its particular value lies in its heavy seeding qualities, the grain being much larger than the other cultivated forms. In India, Japan, and China it is, along with other sorts, extensively grown for food purposes; and in Russia alone the annual production is over 80,000,000 bushels.

CONDITIONS ESSENTIAL TO GROWTH.

All millets come under the heading of "Summer Crops." They are very rapid growers, and for this reason a full return can only be secured where an abundant supply of moisture and plant food is readily available.

The successful raising of millet depends, therefore, upon the presence of—first, warm moist climatic conditions; and, second, a plentiful supply of available plant food near the surface of the soil.

The first essential mentioned requires that the best time to plant is during the moist summer months. On the coast the maturing of a crop—intended for hay—during the middle of the wet season should be, if possible, avoided.

The second requisite means that the soil should be broken up well in advance of the planting season and put into thorough good tilth. Being, as already mentioned, an extremely rapid grower, unless a plentiful supply of constituents is readily available, early maturing with a corresponding light yield is the result. In poor soil the use of a mixed fertiliser would be a distinct advantage.

SUITABILITY FOR HAY.

Millets are not generally looked upon as a crop that can be converted into a good-quality hay or chaff. Judging by the inferior samples often found on the market and exhibited at agricultural shows, it is little wonder that this plant is not looked upon with more favour. Fortunately, this is not the fault of the crop, but of the grower; for properly-made panicum hay is nutritious and palatable, and equal in feeding value to a good deal of the oaten and wheaten chaff made on the coastal side of the Main Range.

HOW THE HAY SHOULD BE MADE.

To make a high-quality hay from millet, it is absolutely essential that the crop be harvested at a particular stage in growth—that is, immediately after it has blossomed, and before the seed has commenced to fill.

Owing to the quick-maturing habit of the plant, this period—especially in a dry time—does not last for probably more than three or four days, and is easily recognised by the clouds of pollen dust seen when the plant is shaken.

It would be quite safe to state that 95 per cent. of the Panicum crop is allowed to get a long way past the stage mentioned before being harvested for hay. This results in the stalk getting hard and fibrous, so that, when cured, it becomes unpalatable and has, moreover, lost much of its nutritive value.

When an oaten crop is allowed to get almost ripe before being cut for hay, it is found that much of the nutriment has gone from the stalk into the grain. This matured grain is recognised as a very valuable food. On the other hand, matured seed of the common Panicum is considered by numerous farmers to be positively dangerous if fed to horses.

It may be asked: "If over-maturing has such a detrimental effect on the value of the Panicum crop, why does the farmer favour such a practice?" The answer is: "For convenience in handling." By harvesting with the reaper and binder, much less manual labour is required, for, if cut at the proper stage for hay, it would be found that the crop would be too succulent to be bound. In that condition it would be almost impossible to cure the heart of the sheaf. It is, therefore, allowed to stand until much of the moisture present has disappeared.

To obtain the best results the mowing machine should be used, and the material raked into windrows and cocked. If cocked properly, it will dry in less than half the time taken if bound in sheaves and stacked —a big consideration if the weather is at all uncertain.

Briefly, the advantages of this crop may be summarised as follows:—

1. It can be grown in warm limited localities where cereals would be an absolute failure.
2. Being a summer crop, it can be raised when moisture is plentiful for full development.
3. The yield per acre is heavy compared with cereals, and the crop is much more quickly maturing.
4. It is a very suitable and convenient crop to handle for silage purposes.
5. It is an excellent crop for clearing land infested with weeds.
6. It could be profitably employed in the event of the maize crop proving a failure, and also as a catch-crop for ploughing-under to restore vegetable matter to the soil.
7. The Panicum family has, so far, been free from any form of disease.

SWEET POTATOES AND GRAPES AT YEULBA.

Our illustration shows a fine crop of sweet potatoes grown by Mr. J. Giddins, senr., at "Forest Farm," Yeulba, from cuttings planted in November last. Many of the tubers weigh up to 22 lb. The sweet potato is no longer grown to such an extent as in the old days of

PLATE 131.—SWEET POTATOES GROWN AT FOREST FARM FROM CUTTINGS PLANTED IN NOVEMBER, 1912

kanaka labour, when a great portion of the rations of 12,000 "boys" consisted of this wholesome vegetable. Our second illustration depicts "one of the proprietors," who is evidently asserting his rights in the crop. The bunch of Black Prince grapes grown on the same farm

speaks well for the prospects of vine-growing on the 2-ft. deep sandy loam on which the grapes were produced. Mr. Giddins also sends a photo. (too dark for reproduction) of a peculiar form of prickly-pear found on Bendemere Station in a bunch of ordinary pear. It was the

Plate 132.—The Forest Farm Boy wants his Share of the Crop

only one of the same kind found in the locality. Judging by the formidable array of spines on the leaves, it would seem advisable to, if possible, discover more of the same kind and exterminate them.

Plate 133.—Clusttr of Black Prince Grapes Grown on Forest Farm, Yeulba.
Soil, a Sandy Loom, 2 feet deep, overlying hard clay.

Pastoral.

FLIES IN RABBIT BURROWS.

Prior to the advent of the rabbit pest, the writer has found, on a cold winter's day, the remnants of the year's production stowed away in hollow logs and trees, but never in any numbers. Apparently these shelters were not sufficient to preserve any large numbers, and the death toll claimed by cold and frost was proportionately large, and thus the blowfly was kept within reasonable limits. But with the advent of the rabbit pest not only were increased breeding facilities provided, but, what was of more importance, increased and more effective protection against winter's cold and frost was provided in the innumerable rabbit burrows that now dot our inland territory. The writer, while conducting fumigating experiments in rabbit burrows on a bitterly cold winter's day, has driven the blowfly out of his warm, comfortable winter's quarters in bunny's home more like swarms of bees than the usual congregation of flies. They were in a semi-torpid state, and quite unable to fly, and in some instances, as they slowly crawled out of the smoke-laden recesses of their winter's quarters, may have easily been mistaken for swarms of bees. As a result of these experiments, it was noticed that they wintered together in numbers, and selected the burrows that were specially suitable for their purposes, as only a percentage of the burrows treated disclosed the presence of the fly, but always in considerable numbers.

If, as these experiments seem to indicate, the burrow is the common habitat of both the rabbit and blowfly pests for at least a portion of the year, then all the greater reason why special attention should be devoted to the destruction of this vulnerable point in the life histories of both pests. This common point of attack is well worth consideration.—"Dalgety's Review."

MAGGOT FLY—TREATMENT OF SHEEP.

Mr. W. G. Brown, Wool Expert, has forwarded us the following circular issued by Messrs. William Cooper and Nephews, Sydney, which he considers will be of interest to sheep farmers:—

The maggot fly has been rampant in the Coonamble district of New South Wales this season, and the experience at our Quambone Station will be of interest and may be of great practical value to other pastoralists.

No parasites are present in the sheep, but they are dipped each season for wool improvement and against the fly.

The dip is used at the strength of 1 packet to 110 gallons of water (slightly greater than the ordinary strength given in the "directions

for use"), and dipping follows on the shearing, the sheep carrying from about seven to ten weeks' growth of wool when dipped. Shearing takes place in August and September.

From the wool-improvement point of view, the results are very gratifying, the selling brokers' report on last year's clip stating that—

"The wool opened surprisingly well, and generally showed but slight evidence of the droughty season experienced, the staple being sound, of nice length, and of good colour.

"The ewe hogget wool was most attractive, showed excellent character and growth, even and of good colour.

"The range of values is the highest we have seen for Coonamble wools this year."

With regard to the maggot fly, reporting on 3rd March, 1913, the station manager advised—

"The blow fly is about in large numbers again since the recent rains. We are not being troubled as yet, thanks to the dipping. Many people in this district are having considerable trouble, and are now commencing to crutch."

On 3rd April, 1913, he reported—

"Up to the present we have had no trouble with the fly pest, although they are now about in large numbers."

On 5th May, 1913, the report is—

"Up to date, whilst lamb marking, we have had to dress about 5 per cent. of our ewes. The maggots do not appear to have left the stained wool. I attribute this to the dip having remained in the dry wool.

"Speaking of the district generally, the fly is very bad."

Reporting on 2nd June, 1913 (lamb-marking having been completed), the station manager advises—

"May has been an exceptionally bad time for the fly, the damp, muggy weather being all in its favour. In our young ewes as many as 15 per cent. have been blown, but we found at marking time that in about 1 per cent. only had the maggots travelled beyond the stained wool.

"The month has been said by many district people to have been worse than 1911 for fly trouble."

The maggots not getting beyond the stained wool, in the case of the ewes that were struck by the fly, means that they were killed by the arsenic from the dipping that remained in the wool before they could work on to the skin of the sheep.

With regard to fly trouble among the lambs.—This is another respect in which splendid results from the use of "Cooper" are obtained at Quambone. The lambs are dressed after marking with the following mixture:—

Cooper's Powder Dip, 1 lb.		Thoroughly mixed together and thoroughly applied with a small hand mop, which can be bought for 6d.
Water	5 galls.	
Cooper's Fluid Dip, 1 pint		
Water	5 galls.	

The station manager writes—

"For some seasons past we have used this mixture, which is far and away ahead of anything we know of, and we have never had any trouble with flies among the lambs, while other people we know of have had considerable losses, some of them serious ones."

For treating sheep suffering from maggot wounds, the same dressing is found to be the best.

The cost of the mixture works out about one-thirtieth of a penny per head for dressing lambs at marking time, and about one-twentieth of a penny per head for dressing sheep suffering from maggot-wounds.

There is no doubt as to the absolute reliability of the foregoing, and the methods adopted with such gratifying results are available to all.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF AUGUST, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie ...	Ayrshire	15 July, 1913	1,165	5·0	63·77	
Honeycomb e	Shorthorn... ...	7 June ,,	862	4·8	46·69	
Nellie II. ...	,, ...	5 June ,,	787	4·8	42·52	
Bee	Jersey	7 July ,,	648	5·4	41·02	
Gretchen ...	Holstein	19 June ,,	757	4·8	41·01	
Burton's Lady	Shorthorn... ...	23 June ,,	809	4·2	38·02	
Countess of Brunswick	,, ...	22 July ,,	729	4·4	36·00	
Miss Edition	Jersey	19 July ,,	676	4·7	35·77	
Bluebelle ...	,, ...	13 July ,,	680	4·6	35·19	
Daisy ...	Holstein	14 Feb. ,,	593	4·8	32·13	
Miss Melba	,, ...	22 Jan. ,,	505	5·0	28·61	
Lady Margaret	Ayrshire	26 Mar. ,,	463	5·2	28·30	
Davidina ...	,, ...	6 May ,,	489	5·0	27·59	
Gem ...	Shorthorn ..	8 Aug. ,,	571	4·7	27·04	
Sister Elizabeth	Jersey	19 June ,,	369	5·4	23·61	
Lady May ...	Ayrshire	30 May ,,	422	4·8	22·82	
Lark ...	,, ...	22 Jan. ,,	505	4·0	22·76	
Cocoatina ...	Jersey	19 May ,,	494	3·8	20·91	

The Horse.

OBSERVATIONS ON THE CLINICAL DIAGNOSIS OF GLANDERS.

BY C. H. SCHULTZ, Veterinarian,
Veterinary Research Laboratory, Alabang, Rizal, in the "Philippine Agricultural Review."

With the advancing knowledge of medicine, the subject of prophylaxis is steadily assuming a more important place, especially as related to infectious and epizootic diseases. Diseases that are transmissible from animals to the human family have, during the last three decades, received special attention. If we can reduce the number of animals affected, and reduce the number of carriers of germs destructive to animals and man, we reduce the mortality among our population and limit economic losses.

In no other class of diseases is it so necessary to establish, at the earliest possible moment, a correct positive diagnosis as in outbreaks of epizootic diseases.

Among this class of maladies, glanders has always been recognised as of the utmost importance, because it is fatal to man and because the economic losses to the community through death of horses are great.

In order to control an outbreak of glanders successfully, a positive identification of the disease affecting the living horse is necessary. At times easy, it is often very difficult to establish a diagnosis that will be supported by *post-mortem* examination.

Many different methods have been advanced by numerous investigators, not one of which, however, answers all phases or all conditions brought about by the contagion. Besides considering the history of the suspected animals and clinical appearance at the time, the veterinarian must be familiar with the different special methods that have, from time to time, been brought forward to detect obscure cases of glanders:—

1. The consideration of the clinical symptoms, subjective and objective, as they present themselves upon a careful physical examination of the animal is most important and may decide the case. Since, whenever the clinical diagnosis is at fault, a serious loss to the owner results, it must be supported by other special methods. Therefore we have to consider:
2. The excision of an enlarged gland and its microscopic examination.
3. The cultivation on suitable media of the organisms causing glanders derived preferably from excised tissue.
4. The inoculation of susceptible animals.
5. Auto-inoculation.
6. The subcutaneous injection of mallein.

7. The cuti reaction, now discarded.
8. The agglutination method.
9. The precipitation reaction as improved by Konew.
10. The complement fixation reaction.
11. *Post-mortem* examination whenever possible.
12. The ophthalmo reaction, or, if we are more careful and correct in our expression, the conjunctival reaction.

It is scarcely necessary to dwell upon the drawbacks of these special diagnostic methods. Veterinarians are all familiar with the limitations of the mallein test, as an example.

Considering the sero-diagnostic methods, we must say that they can be carried out only in properly equipped laboratories. During the early stages of the disease, the complement fixation test used by Mohler (1) often fails to give positive results. Whenever the animal has been infected ten days or more, this test is, however, the very best method to detect glanders infection.

Among all these methods the busy clinician finds but one by which he can distinguish in a prompt and satisfactory manner animals that show obscure symptoms, or differentiate other diseases with smyptoms similar to glanders.

About 1907 Vallée attempted to diagnose glanders in horses by the introduction of mallein into the conjunctival fold of the lower eyelid. He soon discarded the method as unreliable. Several investigators, however, were busy in devising methods suitable for clinical examinations.

Schürer (2) reported favourably on the conjunctival reaction as early as 1908, and its extensive use in the Austrian military service since then has demonstrated its value.

Fröhner (3) published a very complete report, covering observations upon 21 horses affected with glanders. The diagnosis of all these cases was verified by the introduction of 2 drops of a solution of 5 centigrams of dry mallein Foth dissolved in 4.5 cubic centimetres of 0.5 per cent. solution of carbolic acid. After twelve hours in positive cases a large quantity of purulent or muco-purulent discharge agglutinated the eyelids. Its production was continuous for twelve to thirty-six hours, more or less, in different cases. The discharge was pale yellow in colour with a tendency to become viscid. The long hairs on the eyelids soon became matted together, especially near the inner canthus, and the discharge was often so profuse that it ran down over the cheek. The conjunctiva was markedly congested, and sometimes the eyelids were swollen. The same amount of the same mallein solution applied into the lidsacs of healthy animals failed to produce any disturbance whatsoever. The reaction in these horses was typical, although the temperatures of the animals were high, between 38.5 and 39.5 degrees C., which would prohibit the mallein test as usually applied. These twenty-one positive conjunctival reactions so carefully described by Fröhner were checked up with the complement fixation tests and the *post-mortem* reports, the results corresponding.

In 1911, Muller, Gächtgens and Aoki ([4]) published an interesting article on the relative value of sero-diagnostic methods and the conjunctival reaction as applied to glanders suspects among horses. From their observations they draw the conclusion that the introduction of a suitable mallein solution into the eye is the best and most practicable method to diagnose occult and doubtful cases of glanders.

In an exhaustive illustrated article Miesner ([5]) compares the results obtained with the complement fixation test, the agglutination tests, and the conjunctival reaction.

All these tests were executed with great care, the results are published in comprehensive tables, and they are substantiated by careful *post-mortem* reports.

One hundred and thirty-three glanders suspects were tested by the three different methods, and the results are compared and analysed. As a diagnostic agent he used 3 centigrams of dry mallein Foth dissolved in 3 cubic centimetres of sterile normal salt solution. The solution was applied by means of a pipette or camel's-hair brush to the conjunctival fold of the lower eyelid. The reaction appeared in six to twelve hours, and expressed itself in a pronounced discharge from the inner canthus, which was muco-purulent, adhering to the lower lid, sometimes running down the cheek. In some cases a pronounced edematous swelling of both eyelids could be noted which produced a glassy appearance of the lids. Marked congestion of the conjunctiva and often complete agglutination of both lids were produced. After from fourteen to twenty-four hours, the eyes began to clear up. Among 133 animals examined 59 glandered horses were diagnosed through the complement fixation test, an accuracy of 100 per cent. Fifty glandered horses were detected by the agglutination method, which number constituted 84 per cent. of the cases detected by the complement fixation test. The conjunctival reaction detected 53 cases, or 90 per cent., of those shown by the complement fixation test. The complement fixation test did not condemn any healthy animals. The agglutination test condemned 2 horses, or 2.7 per cent. of the healthy animals. The conjunctival test produced no reaction in sound horses.

The local application of a suitable mallein solution into the eye did not influence the sero-diagnostic methods.

From Java there is at hand a report of the work of Dr. L. de Bliek ([6]), director of the veterinary laboratory in Buitzenborg (Nederlandish India), who also endorses as simple and reliable the instillation of a solution of crude mallein into the eye. The conditions prevailing in this tropical region are similar to the Philippines, and the animals affected show similarity in conformation and uses. The report considers every phase of diagnostic methods, compares the results of the agglutination and the complement fixation test, the subcutaneous injection of mallein, and the conjunctival test.

Results obtained with the last-named reaction were so satisfactory that De Bliek uses it in preference to older methods, and hopes to eradicate the disease from the Island of Java by its systematic application.

Ten cases of strangles, 4 of saccharomyces, 5 of osteomalacia, and 1 of chronic catarrh of the sinuses did not react to the eye test.

Personal experience of the present writer, in four widely-separated localities, has demonstrated the conjunctival reaction to be satisfactory and simple. During an investigation of an outbreak of contagious disease among native ponies at Calamba, belonging to the Philippine Sugar Estates Development Company, its application gave negative results. *Streptococcus equi* was subsequently isolated from the afflicted animals, thus identifying the disease as strangles.

A glanders suspect was tested at the clinic of the College of Veterinary Science, University of the Philippines, and gave a positive reaction. The same animal was again tested at the veterinary research laboratory at Alabang. Its temperature was 39 degrees before the subcutaneous injection of mallein, and did not rise during the following forty-eight hours. The swelling around the point of injection was 5 by 7 centimetres, hot and painful, and remained until the animal was destroyed. The application of 3 drops of concentrated mallein into the left eye produced after twelve hours a profuse pus-like discharge, pale yellow in colour, which adhered to the hairs and to the inner canthus of the eye. The conjunctival membranes appeared inflamed and swollen; the pus flakes would at times cover the entire cornea. *Post-mortem* examination showed changes characteristic of glanders in the lungs, liver, and on the nasal septum. *Bacterium mallei* was recovered from guinea pigs inoculated with pus from the submaxillary glands.

The same concentrated mallein was introduced into the eyes of five native ponies, selected at random, without, however, producing any changes. The mallein used in these tests was made from old cultures of *Bacterium mallei* at the veterinary research laboratory at Alabang.

In order to obtain a specific conjunctival reaction in animals affected with glanders, it is necessary that no irritating substances shall be present in the test fluid used, and that only a specific, intense mallein reaction be obtained. Five per cent. sterilised aqueous solution of carbolic acid or preferably sterile normal salt solution are the solvents used to make up a 1 per cent. solution of dry mallein Foth. It should be freshly prepared; 2 or 3 drops are applied to the conjunctival membranes of the lower lid. This may be done with a pipette or with a camel's-hair brush. A small hypodermic syringe with a short blunt needle is quite suitable.

The changes considered indicative of a positive reaction appear in six to twelve hours, and usually begin to recede after twenty-four hours. If the reaction proves uncertain, the application should be repeated in the same eye in the same manner twenty-four hours after the first instillation. According to Miesner, this will show no increase if negative, or a marked increase if positive.

The test cannot be repeated afterwards, since the membranes of the eye become accustomed to it and fail to react in a typical manner for some time. The other eye can then be used.

The ease of application, the ready manner with which the necessary materials can be obtained and carried, the simple interpretation of the results, visible to the veterinarian and owner alike, the rapidity with which a great number of animals can be passed upon, have at once recommended the conjunctival reaction to our profession. It produces a typical reaction even when the animals have high temperatures, as in the cases reported by Fröhner.

An important fact in its favour, so far as present reports are available, is that it does not condemn horses that are not affected with glanders. In addition, it is an easy matter to test the solution on healthy animals or to accept the nonreactors as checks.

The clinician who is often in trouble when he meets glanders suspects has, therefore, at his command a diagnostic method at once reasonably correct (90 to 94 per cent.) and simple, and independent of the laboratory methods—something that will permit a vigorous fight along rational lines against one of our most dangerous diseases. It is of the utmost importance to be able to verify the physical examinations at once, and identify such a high per cent. of occult cases without having to refer to distant laboratories.

Recently a disease resembling glanders has been reported in the Island of Catanduanes, and the authorities of the Province of Albay, together with local horse-owners, have applied to the Bureau of Agriculture for assistance. The writer is at present engaged in field work on that island designed to control the disease. A comparison will be made of the accuracy of the various means for recognising glanders, such as clinical diagnosis, the subcutaneous inoculation of mallein, the agglutination methods, the complement fixation reaction, and the ophthalmo reaction. All will be supplemented, wherever possible, by *post-mortem* examination, the results of which will set the standard with which to compare the accuracy of the various tests.

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THE SUFFOLK PUNCH AS A PLOUGH HORSE.

In a very interesting article on "British Live Stock," in "Dalgety's Review" for August, 1913, the following notes on the Suffolk breed are confirmatory of what the advocates of the breed as an ideal farm horse have always claimed for it:—

How long this breed has been associated with the country is unknown, but they are mentioned as far back as 1506 in Camden's "Britannia." The Suffolk "Punch" was named from its native county and from its thick-set body on short legs of the early form of the present breed, though it now attains a height approaching that of the Shire or Clydesdale. Its most conspicuous points of difference from the Shire and Clydesdale are its chestnut colour and its freedom from the abundance of long hair on the legs. The absence of this hair makes the Suffolk look rather heavy for its legs in the eyes of those accustomed to the other breeds, but actual measurement shows that it is not unduly short of bone, which, moreover, is of good hard quality, and stands the test of hard work. The breed is also famous for fruitfulness and longevity, and for a docile but courageous disposition and even-tempered willingness to work.

The natural gameness shown by the indomitable continuous effort which the Suffolk horse is willing to make at a dead pull, even beyond his strength, has been inherited. His ancestors were pitted against each other in draw matches, and the soft disposition which refused to try honestly would naturally be eliminated by the usual process of selection. This inherited quality is also seen in the young horses taking kindly to work and requiring little breaking. The Suffolk is an ideal plough horse, preferred and appreciated in East Anglia, but it is also in high favour in large towns as a vanner for the delivery of the lighter classes of goods, though some of the best modern Suffolks compare not unfavourably with Shires as regards weight. Frequently geldings in good condition weigh over a ton each. The height averages about 16½ hands, but varies from below 16 up to 17. The girth behind the shoulders is about 8 ft.—sometimes a little more. The Suffolk is also notable for the power of doing well on little food, working long hours without a meal, and of continuing to work to a greater age than other draught breeds. Suffolks in the eastern counties of England lie out in yards all through the winter, the only shelter provided being an open shed. They keep in most excellent condition through the most severe weather, and look almost as well in the coat as other breeds which in England are required to be stabled.

AUSTRALIA'S EXPORTS OF FROZEN MEAT.

For the first four months of this year Australia exported frozen meat to the value of £1,350,000, compared with £649,000 for the corresponding period of 1912.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1913.

Five thousand three hundred and forty-five eggs were laid during the month, an average of 133.6 eggs per pen. All the birds have now settled down to business, and are doing good work. J. R. Wilson's pen of White Leghorns wins the monthly prize with 156 eggs; this has put them in the lead. The following are the individual records:—

Competitors.	Breed.	August.	Total.
J. R. Wilson	White Leghorns	156	647
A. H. Padman, S.A.	Do.	130	633
T. Fanning	Do. (No. 2)	140	623
O.K. Poultry Yards	Do.	144	623
Loloma Poultry Yards	Do.	132	590
F. McCauley	Do.	127	589
T. D. England	Do.	131	586
S. E. Sharpe	Do.	136	584
Range Poultry Farm	Do.	149	575
Moritz Bros., S.A.	Do.	145	574
J. Zahl	Do.	125	548
J. F. Coates	Do.	134	547
H. Tappenden	Do.	130	543
E. A. Smith	Do. (No. 2)	142	540
Cowan Bros., N.S.W.	Do.	119	529
R. Burns	Black Orpingtons (No. 2)	135	528
J. McKay	White Leghorns	129	516
R. Burns	Black Orpingtons (No. 1)	138	504
Mrs. Sprengel, N.S.W.	White Leghorns	126	497
Doyle Bros., N.S.W.	Do.	132	496
J. Jobling, N.S.W.	Do.	127	496
Mrs. Munro	Do.	127	495
A. T. Coomber	Do.	141	492
J. Gosley	Do.	118	487
H. Hammill, N.S.W.	Do.	152	468
Yangarella Poultry Farm	Do.	142	468
D. Grant	Do.	129	465
W. D. Bradburne, N.S.W.	Do.	139	462
A. F. Camkin, N.S.W.	Do.	128	460
E. A. Smith	Do. (No 1)	147	457
A. Schbrowski	Brown Leghorns	129	435
T. Fanning	White Leghorns (No. 1)	136	411
C. Leach, N.S.W.	Do.	136	403
T. Stephens, N.S.W.	Do.	126	402
J. Archibald, N.S.W.	Do.	136	400
Mrs. Craig	Do.	126	398
J. Andersen, Victoria	Red Sussex	118	393
J. Murchie	Brown Leghorns	132	386
Mrs. Bieber	Do.	129	334
A. J. Collis, N.S.W.	White Leghorns	127	319
Totals ...	...	5,345	19,903

The Orchard.

THE PAPAW IN QUEENSLAND.

Amongst the many tropical fruits which thrive in Queensland, along the whole of the coast from the Tweed River to Cape York, the papaw takes a prominent place. It is seen growing in all sorts of localities—on sugar plantations, orange groves, banana plantations, in pineapple fields, on dairy farms, in private gardens, and in the back yards of 16-perch allotments; and it seems to thrive under the most adverse conditions of soil, rainfall, and cultivation. It has generally been supposed in the Southern States, to which many hundreds of cases of the Queensland

Plate 134.—Papaw Trees on Messrs. McLaughlin and Son's Orchard, Sunnybank.

papaws are sent, that the heaviest of our papaws does not exceed 6 lb. in weight. This is a delusion which a visit to some of the farms close to Brisbane, or away in the North at Bowen and elsewhere, would probably dispel. To give only one instance:—Nine miles from Brisbane, there is a pretty little fruit-growing district on the South Coast line, called Sunnybank. Here the papaw may be seen in perfection. On one of the orchards (and this is not a solitary instance) owned by Messrs. McLaughlin and Son, there are papaw trees which were two years old last Easter, when the accompanying photograph was taken. Many of the trees were carrying from 70 to 170 fruits, weighing from 2 lb. to 9¼ lb. each, nothing being thinned out. On 25th August we received a

sample of the fruit from one of the trees in the photograph, which weighed 9¾ lb., and which was of delicious flavour. Some of the trees, which are too tall to be conveniently photographed, are carrying as many as 170 fruits densely packed, and this is allowed, as the fruit trade require small as well as large fruit.

The trees on this orchard are manured with cow manure, combined with blood, bone, and potash; and a mulch of gum boughs is placed at the base to protect the roots, which are very near the surface, from the sun's heat; and this latter precaution is responsible for the improvement in size and numbers of the fruit, as is proved by the fact that some trees which had not been so mulched, although manured like the others, bear no comparison as regards size of fruit to the mulched trees. It is a common thing to see South Coast and Bowen papaws in the shops of 8, 9, and 10 lb. weight. We note that a writer in the "Sydney Mail" of 6th August last states that papaws can be grown on the Northern Rivers (New South Wales) far superior to anything that can be grown in Queensland. We cannot dispute this, as we have never seen any New South Wales papaws in Queensland; but the Queensland papaw can hold its own for weight, and particularly for delicious flavour, which could not be produced except under sunny skies such as those of Queensland.

FRUITS SUITABLE FOR DOWNS COUNTRY.

By ALBERT H. BENSON.

In the first place, Downs country, taken as a whole, is by no means typical fruit land, the heavy black soil, treeless plains so characteristic of such country being better adapted to the growing of all kinds of farm crops suitable to the climate than to the production of fruit. At the same time there are patches of country all over the Downs that, given the necessary preparation of the land, the selection of suitable varieties, and the proper care of such trees when planted, will produc first-class fruits valuable both for home use and local consumption.

The most suitable soils for fruit culture are free chocolate loams with rotten rock subsoil, free loams of brown or red soil, and sandy loamy soils. When selecting an orchard site on such soils, see that it is as level as possible, or at any rate only gently sloping, as such soils usually have good sub-drainage. If the site selected is on a slope, heavy rainfall causes too much washing of the soil, especially where the land is kept in the high state of tilth so essential to the retention of moisture in the soil during dry spells, and on which successful culture will very largely depend.

Prepare the land thoroughly before planting; better get 1 acre well done than 10 acres indifferently, as it will give more satisfaction and pay better in the long run. Plough the land well and subsoil as deeply as you can, so as to get as large a body of soil as possible available for the trees' use, as once the trees are planted it is impossible to get the land into as good a condition as if the work is done in the beginning. Remember that planting an orchard is not like growing a corn or wheat

crop, which only occupy the soil for a few months, but that an orchard will occupy the land for many years; hence the initial preparation of the land must be as thorough as possible. This has been amply proved at the Westbrook and Hermitage State Farms, where the initial work was well done, and the trees have made remarkable growth and produced fruit of superior quality in consequence.

When planting, don't crowd your trees; 25 ft. by 25 ft. is quite near enough for most varieties, as, when the trees attain any size, the roots will occupy the whole of the ground. If crowded, cultivation is difficult, and the trees soon show signs of distress in dry weather; the result being a crop of inferior undersized fruit, which is of little value and hard to dispose of.

Keep the orchard well cultivated; prune thoroughly; keep diseases in check by spraying and the gathering and destruction of infested fruit. The best cultivators for orchard use are of the Planet Junior and Senior types, top-notch cultivators, spring-tooth cultivators, and Morgan spading harrow. As to pruning, I cannot give better advice than that already given in the "Queensland Agricultural Journal" by both Mr. Voller and myself; and for keeping down diseases the best all-round winter spray is the lime, sulphur, and salt wash, which is both an insecticide and fungicide; tobacco or resin washes are the best for black aphis in spring; and the gathering and destruction of infested fruit at all times is the best remedy for the fruit fly.

In selecting fruit for Downs country the question of earliness is of paramount importance, as early ripening fruit usually escapes the ravages of the fruit fly; at the same time, many of the best fruits are mid-season; and both in the case of those growing for the market and those growing for home consumption it is advisable to grow such fruits, so as to prolong the season as far as can be safely done. As to late deciduous fruits, although many varieties do well, the risk of fruit fly is too great; and also at the time at which they would ripen there is an abundance of superior fruit available in the Southern States which is being placed on our markets.

So many varieties of fruit will grow on the Downs that it is a difficult matter to make a selection of the most suitable, especially as some varieties do better on one class of soil than another. The following general information may be of some little value:—

ALMONDS.—Choose warm light soils in a position as free as possible from late frosts, as this fruit blossoms very early. Plant three or four kinds together, so as to secure fertilisation of the flowers. Single trees are often poor bearers, owing to the fact that the flowers are usually incapable of fertilisation by their own pollen. The best varieties are Early Jordan, Brand's Jordan, IXL, and La Prima.

APRICOTS.—This fruit does best on good rich loam, though it will stand a stronger soil than many other kinds of fruit. The trees require severe pruning at first, as they are apt to become very straggling if neglected; but, once well in bearing, the pruning is not difficult. The following varieties will be found to suit generally:—Pennant Hills Oval, Oullin's Early Peach, Moorpark, Hemskerke, Alsace.

Apples.—Apples do fairly well on any soil, the heaviest black soils excepted, but are of best quality when grown on free soils. A very large number of varieties can be grown, but, for commercial purposes, only the earlier ripening sorts are worth planting. The following kinds do well generally:—Early Richmond, Carrington, Gravenstein, Lord Nelson, Lord Suffield, Scarlet Pearmain, W. E. Gladstone, Alexander, Trivett's Seedling, Frampton, Prince Bismark, Prince of Pippins, Twenty Ounce. Many other varieties do well, but the list given contains the most of the best kinds for marketing during December and January. If later varieties are wished, Jonathan, Stone Pippin, London Pippin, Winter Majetin, and Monroe's Favourite may be tried.

Pears.—This fruit does best on good rich loam—fairly strong land. It must be grafted on seedling stock, not suckers; if dwarf trees are required, it should be worked on quince, not hawthorn. The following varieties will be found most profitable:—Williams, Bonchrêtien, Clapp's Favourite, Beurre Bose, Beurre Clairgeau, Marie Louise, Gansell's Bergamot, Winter Nelis; for cooking, Uvedale's St. Germain, and Vicar of Winkfield.

Peaches.—This fruit does well generally in any good fruit soil. To ensure fine fruit, the peach requires more severe pruning than any other fruit tree, as the best fruit is always produced on the strong wood of one year's growth. Many worthless seedlings are grown, but the following varieties have proved themselves valuable:—Governor Garland, Alexander, Brigg's Red May, Hale's Early, Foster, Elberta, Lady Palmerston, Globe, Robert Stewart. There are many other varieties, some much later than any of those mentioned, but there is too much risk of fly with any peaches ripening much later than the end of January.

Nectarines require similar soil and treatment to peaches. The best varieties to grow are as follows:—Irrewarra, Early Rivers, Albert Victor, Elruge, Stanwick seedling.

Plums.—Nearly all kinds of plums do well on the Downs, though many varieties of particular species are not profitable, the fruit being either too small or inferior or the trees are not good bearers. Of the American type, the Red Cherry Plum is the earliest and best; of the Chickasaw type, the fruits of which are all practically fly-proof, there are several good varieties, though the fruit of some is on the small side. Chickasaw plums must be worked on peach stocks, not suckers. The best varieties are:—Helm, Robinson, Wild Goose, Cumberland, and Golden Beauty. It is not advisable to plant many plums of this type, as they are not equal in quality to European varieties, though their freedom from fly is a great consideration to all who grow for home use. European Type:—Evans' Early, Crittenden's Prolific, Angelina Burdett, Reine Claude de Bavay, Diamond, Purple Gage, Washington. Japanese Type are best worked on peach roots. Burbank, October Purple, Wickson, Red Heart, and Kelsey are about the best kinds. The trees are apt to overbear, and the fruit requires thinning. Unfortunately, the fruit fly is very partial to this fruit.

Figs.—This fruit does best on warm, well-drained soils, and in situations as free from frost as possible. Under such conditions the following varieties will all be found to do well:—White Adriatic, Brown Turkey, Brunswick, Coldi-Signora Nero, Large Black Genoa.

Olives.—Although there is practically no demand for olives in this State, there are, in my opinion, few places better adapted for the culture of this fruit than the Downs. The tree is a strong grower and most prolific bearer, and would make one of the best breakwinds or shade trees for the plain country. It does best on chocolate soils with rotten rock subsoil, but will thrive on almost any soil once it becomes established. I cannot say what varieties are likely to do the best, as only a few named sorts have been tried, all of which have certainly done well; so that I feel sure that most of the very best varieties for oil and pickling will do well.

Citrus Fruits.—No citrus fruits can be grown to compete with those raised in more suitable parts of the State; hence their cultivation is not recommended.

Loquat.—This fruit does well. The Gigantic variety is the best to grow.

Mulberries do well. The Black is the finest fruit where the trees can be got to grow.

Walnuts.—Though not cultivated to any extent, the walnut should do well wherever there are any deep alluvial soils, and, once it becomes established, it is likely to become a profitable tree.

Pecan Nut.—This tree will probably thrive in soils such as I have mentioned as being suitable to the walnut.

Berry Fruits.—With the exception of the strawberry, no berry fruits are worth growing. Where water is available, the strawberry will do well. Pink's Prolific, Trollope's Victoria, Royal Sovereign, Aurie, and Laxton's Noble are some of the best varieties to grow.

Quinces.—Apple-shaped and Portugal are the hardiest and best.

Persimmons.—This fruit is not a success on heavy soils; on free soils, however, a few trees may be planted. Seedless varieties, such as Hacheya or Yemon, are the best kinds.

Cherries.—I cannot recommend the growing of this fruit on a commercial scale, but for home consumption the following kinds can be tried:—Early Purple Guigne, Belle d'Orleans, and Twyford Bigarrean.

In conclusion, I may say that, for commercial purposes, apricots, plums, and peaches will probably be found most profitable, but any of the other fruits I have mentioned can be grown for local use or home consumption.

FRUIT-GROWING IN QUEENSLAND.

One of the pleasantest and most attractive of rural industries in all countries is that of fruit-growing, but this is particularly the case in Queensland, which is a land of gardens and orchards; and no branch of agriculture has made greater advances during the past thirty years than that of fruit-growing, nor has any other become more popular, notwithstanding the extraordinary number of enemies which the orchardist has to contend with. In addition to the fact that living under one's own vine and fig-tree is in itself a very pleasant ideal to look forward to, there is no branch of agrimony that calls for a keener appreciation of the laws of Nature, that brings man into closer touch with Nature, that makes a greater demand on a man's patience, skill, and energy, or in which science and practice are more closely related, than is that of fruit-growing.

Queensland offers exceptional advantages to the fruit-grower. The ease with which fruit can be produced, when grown under conditions suitable to its proper development, is often remarkable and is a constant source of wonder to all who have been accustomed to the comparatively slow growth of many of our common varieties of fruits when grown in less favoured climes, and to the care which is there necessary to produce profitable returns.

Fruits of many kinds are so thoroughly acclimatised that it is by no means uncommon to find them growing wild, and holding their own in the midst of rank indigenous vegetation without receiving the slightest care or attention.

Queensland has practically an unlimited area of land suitable for fruit-growing, most of which is still in its virgin state, and there is little fear of over-extending the industry.

The subject under review is so extensive in its ramifications that the limits of these pages will not admit of a hundredth part of what we could write about it. All we can do is to give a very curtailed summary of the industry, and we would advise all interested in it to read the exhaustive accounts published in the Annual Report of the Under Secretary for Agriculture for 1913 and that of the Government Statistician on Agricultural Statistics for the same year.

PINEAPPLES.

Like the banana, the pineapple is a tropical fruit and one very sensitive to cold; hence its cultivation is confined mainly to frostless regions. In this favoured country, its culture is entirely in the open, no shelter whatever being given, although in the Southern pineapple districts—where frosts, sometimes severe, occur—the plants are protected by a covering of grass or hay thrown lightly over them. Pines are in season in Queensland all the year round, and there are always two regular main crops—the summer and the winter crop. It is not at all an uncommon thing to see the rows of pineapples in a field so grown together that the plantation of from 10 to 20 acres appears to be a solid mass of plants, and pathways have to be cut through them to facilitate

the gathering of the fruit and the removal of the plants which have already borne. From the Brisbane district, where pineapples were originally planted, this fruit has spread all over the Eastern coast, and its production is rapidly increasing in several districts. There are two principal varieties of pineapples grown—the large smooth-leaf Cayenne, the fruit of which grows to a large size of from 10 to 15 lb., and even in the tropical North to 18 lb. weight. Incidentally, we may state that we saw, last August, five of these pineapples, the smallest of which weighed 10 lb. Such pines are greatly in demand for canning purposes, an industry which has made rapid headway in Brisbane and in the North. The other variety is the prickly-leaf, blocky Ripley Queen, of exquisite flavour, which attains a weight of from 4 to 6 lb. Thousands of dozens of these pines are sent during the season to the Southern markets, where they realise good prices. Many of these now come from Bowen, on the North Coast; but by far the greatest numbers are grown in and exported from the great pineapple districts of Nundah, Nudgee, Cleveland, Redland Bay, Wellington Point, and Maroochy, Woombye, and other places on the Blackall Range, about 60 miles from Brisbane.

To put land under pineapples costs, if the land has already been cleared of timber and stumped so as to admit of working the plough, about £10 per acre. Each acre carries 4,500 plants, which bear fruit 18 months after planting. At an average price of 1s. 6d. to 2s. per dozen, this means about £38 per acre for the first crop, and, as the suckers spring up round the parent plant, the crop is more than trebled, and the returns rise accordingly. The great secret of pineapple-growing is the same as applied to all other crops—*i.e.*, to get suitable land in a genial climate with a fair rainfall, to work it up thoroughly, keep down weeds, and manure when needed. The area of land under pines in 1912 was 2,584 acres, which produced but a moderate crop of 679,646 dozens, as against 769,926 dozens from 2,414 acres in the previous year.

Besides satisfying local requirements and the Southern markets, canning the fruit is extensively undertaken, no less than 3,839,880 lb. being so treated last year (1912), and in addition 32,348 lb. of pineapple pulp were produced.

The average yield per acre last year was only 263 dozens, the dry weather having adversely affected fructification.

CITRUS FRUITS.

Oranges.

No fruits are more generally distributed, or have a wider range in the State than those of the Citrus family, as they can be and are grown from one end of the State to the other, even on the tablelands where heavy frosts are experienced. The country adjoining the seaboard, extending from the Tweed River, in the South, to Cooktown and beyond it, in the Far North, a distance of 1,100 miles, and extending about 100 miles inland (in parts to 400 miles inland)—that is to say, a belt covering 110,000 square miles—is naturally suited to the growth of

citrus fruits, oranges, lemons, mandarins, &c.; and there is probably no country in the world that is better adapted to or that can produce the various kinds of these fruits to greater perfection, or with less trouble, than this portion of Queensland. At the present moment there are hundreds of citrus trees growing practically wild in different parts of the coastal country—uncultivated, unpruned, and unmanured—which hold their own and produce heavy crops of good fruit in the midst of a growth of native shrubs, trees, and weeds.

Mandarin oranges do remarkably well, and the varieties most commonly grown are—the Emperor or Canton, the Scarlet Emperor, Tangerine, Ellendale, Beauty of Glen Retreat, and others. A crop of 100 dozens to a tree is very common.

Amongst the oranges, the Washington Navel does remarkably well, and is a very high-class fruit. The Jaffa, Mediterranean Sweet, and Valencia are some of the best, and are being planted in the greatest numbers. On one orchard on the Delta of the Don River, at Bowen, there are 4,000 of these trees. The oranges from Maryborough, in the Wide Bay district, are favourably known in the Southern States; and amongst the finest groves are those of the Blackall Range, near Brisbane, and Bowen, in the North. In the Maroochy (Blackall Range district) there were, in 1912, 773 acres of orange trees, of which 500 acres were in full bearing; 467 acres in the Maryborough district; 251 acres at Cairns, in the North; 278 acres at Bowen; not to speak of hundreds of acres in groves varying from 20 to 150 acres. The produce of the whole was, for 1912, 319,544 bushels—a shortage of 150,000 bushels, equal to monetary loss of £40,000, due to dry weather conditions.

MANGOES.

The mango thrives all along the coast line, and the trees bear fruit of a fine description. Unfortunately, they do not travel, and thousands of fine fruit go to waste in all parts of the country on this account. The Australians, unlike the Indian people, do not take kindly to mangoes. The tree serves more as a shade and ornamental tree than as a profitable one from the fruit-growers' point of view. The average yield of fruit per acre is 366 bushels. Last year's recorded yield was below the average, amounting to 111,852 bushels, which was a decrease of 31,417 bushels on the previous year's return.

BANANAS.

The cultivation of the banana is confined in Queensland to the frostless belts of the Eastern seaboard, as it is a plant which is extremely susceptible to cold. Bananas are grown in favourable situations in the South, where they produce excellent fruit; but the cultivation is much greater in the North, owing to the tropical temperature and the heavier rainfall. The Cavendish variety is mainly grown, but large numbers of the Gros Michel kind have of late years been imported, in order to

retain the Southern market. About twelve years ago, Queensland's output of this fruit reached 46½ million dozens per annum; and in 1904 the figures showed 30 million dozens.

The whole of the banana crop is sold in a green state to enable the fruit to reach its Southern destination just as it begins to ripen; but growers have injured the reputation of their fruit by persisting in cutting it in too green a state. What with this and the ravages of the fruit fly, besides the loss by sweating in a ship's hold, and the rough handling of the fruit in loading and unloading, and the competition of Fiji in the Southern States, the Queensland trade has seriously declined. It is hoped that the introduction of the Gros Michel banana will have the effect of once more restoring the banana trade to its former condition. Serious losses were sustained during the past year owing to a cyclone at Innisfail, which destroyed the plantations, and, further, owing to the want of steamers to remove the crop to Cairns. For only one month, the growers in that district lost 1,500 bunches of bananas and hundreds of cases of oranges, owing to the want of means of transport.

The area under bananas in 1912 was 7,037 acres, which produced 1,139,404 bunches. These figures show an increase in area of 581 acres and of produce of 20,206 bunches, as compared with the returns for 1911. The average number of bunches per acre is highest in the Cardwell district, where the average is 301 bunches, Maroochy coming next with 214 bunches. The lowest average is at Maryborough—97 bunches per acre.

TRADE IN FRUIT.

The fruit trade between Queensland and New South Wales is considerable. For the year ending 30th June, 1913, the export trade consisted of 84,890 bunches and 17,668 cases of bananas, 111,518 cases of pineapples, and 29,876 cases of various fruits, such as apples, strawberries, mangoes, &c. In addition, there were 1,950 dozens of melons, 20 cwt. of nuts, 74,090 cases of tomatoes; and of vegetables, 21,028 cases of cucumbers and chillies and 65,484 bags of pumpkins were sent South. Of all that immense quantity, only 10,048 cases of various fruits were condemned.

Experiments in cold storage of fruits are constantly being made and, latterly, with so much success that ripe fruit placed in cold chambers for from 3 to 4 months proved in perfect order at the end of that period. These fruits are regularly exhibited at all the shows in the State. Total export of fruits for 1912: 793,529 crates, bags, bunches, &c. Total imports: 825,719 cases, &c.

STRAWBERRIES.

Strawberries are largely grown, but not in such great quantities as in some former years, owing principally to the exorbitant demand of rural workers for ever-increasing wages and short hours. The districts

of Cleveland and Maroochy practically include all the areas where strawberry cultivation is seriously undertaken. In the former district the area decreased by 12 acres, and in the latter by 4 acres. The total area under strawberries in 1912 was 107 acres, which produced 163,786 quarts; the average quantity per acre was about 1,688 quarts.

APPLES.

Nearly all the apple orchards are situated in the Stanthorpe district, where the climate is admirably adapted to this and other European fruits. Consequently, the orchards are yearly increasing in number and in area. At present 1,345 acres are under apple cultivation in the whole State, 627 acres of which are in full bearing. The produce amounted to only 15,904 bushels, owing to the effects of frosts and dry weather. In 1911 the yield was 40,904 bushels.

OTHER FRUITS.

Almonds, apricots, Cape gooseberries, cherries, cocoanuts, custard apples, figs, lemons, nectarines, passion fruit, papaws, peaches, pears, persimmons, plums, and quinces are largely grown; and, for the first time in the fruit history of Queensland, the Java mangosteen has fruited at the Kamerunga State Nursery.

GRAPE VINES.

In 1912 a larger area was returned as under vines than in the previous year, the figures being—for 1911, 1,292 acres bearing; grapes gathered, 2,973,526 lb.; average per acre, 2,301 lb. In 1912 there were 1,325 acres bearing, and the crop of grapes amounted to 3,317,364 lb.—an average of 2,504 lb. per acre.

Wine-making to-day receives very little attention in Queensland. There are 200 winemakers, who produced 54,627 gallons of wine; and 1,048 gallons of brandy were distilled.

MANDARIN ORANGES—RECORD PRICE FOR.

The mandarin known as "Parker's Beauty of Glen Retreat" has always held its own as a most desirable fruit of the mandarin class. Mr. Parker once showed us one of them, thin-skinned fruits, in which, when held to the light, seeds were plainly visible. The following notice of a sale of Mapleton "Glen Retreats," on 16th September, will show the estimation in which they are held in the market:—Mr. H. J. Kipping's (of Mapleton) mandarins (Beauty of Glen Retreat) on Tuesday in the fruit markets, Turbot street, brought up to 17s. a case on the Fruit Industrial Trading Society's floor. This is said to be a record price for Brisbane. Messrs. Cooper and Co. were the agents. There were between 10 and 12 dozen mandarins in each case.

Tropical Industries.

MOLES FOR THE CANE GRUB.

A few years ago we advocated the introduction of moles for the destruction of the cane grub, but we were met by the assertion (by men who had never been out of Queensland, and hence had never seen a mole or studied its ways) that the little animal would gnaw the roots of the cane plants, destroy the plantations, and eventually become as great a pest as rats or the grub itself. Such reasoning is dogmatic, absurd, and is advanced in absolute ignorance of the habits and structure of this harmless animal. We lately came across the following extract from the "Agricultural Gazette," London, and we give our readers the benefit of it, in the hope that some planter of advanced ideas will be induced to give the creature a trial, provided, of course, that departmental sanction be given to the importation of, say, one single pair, which could, with their first progeny be easily "deported" in the event of their not fulfilling expectations:—

VORACITY OF THE MOLE.

In the first place, there is probably no animal going, domesticated or *feræ naturæ,* so voracious as a mole. It will eat the larvæ of cockchafers (a most injurious insect), all kinds of worms indiscriminately—useful and injurious—frogs, toads, &c., more than its own weight in twelve hours; and experiments have proved that if a mole cannot obtain food for that period it will perish. The mole is, therefore, of the glutton tribe, and for that reason I have never known moles to exist in any particular district in numerically plague form. Besides, the mole has many natural enemies, "Nature's police," such as weasels, stoats, owls, kestrels, buzzards, &c., and if these were not ignorantly and wantonly destroyed the mole-catcher's occupation would be gone. Now, all gluttons, biped or quadruped, are great drinkers, whether of pure water or "fire water," in its very varied poisonous forms; and the moles have a very ingenious method of procuring and preserving water, without which, I am convinced, no mole could live twenty-four hours. M. La Court, a distinguished French naturalist, who made moles and their habits a special study, declared that they even dig deep wells for water in their underground "mansions," and preserve it against droughts. By the way, that writer's description of these mansions," or "fortresses," as he terms them, is peculiarly interesting, and I append a translation of what he wrote:—

Each individual appropriates to himself a district, or space of ground, in which he forms a kind of fortress under a hillock in some secure place, as beneath a bank or near the roots of a tree. In this eminence, of which the earth is rendered very compact, is formed a circular gallery, communicating with a smaller gallery, placed above it, by several passages. On the level of the lower or larger gallery is a roundish cavity or chamber, communicating with the upper three passages. From the outer gallery branch off a number of passages, which run out to a variable extent, and, forming an irregular curve, terminate in what may

be called the high road, which is a long passage proceeding from the outer circular gallery, and at the same time communicating directly with the central cavity. It extends to the farthest limit of the domain, is of somewhat greater diameter than the body of the animal, has its walls comparatively compact, and communicates with the numerous passages by which the domain is intersected. By this principal passage the mole visits the various parts of its hunting-ground, burrowing on either side, and throwing out the earth here and there, so as to form heaps or mole-hills. As it traverses this path several times daily, it is in it that snares are laid for its capture. The excavations vary in their distance from the surface, according to the nature of the soil and other circumstances. In deep, rich earth they are sometimes nearly 1 ft. in depth, while in gravelly or clayey ground, covered with a thin layer of soil, they are often scarcely an inch. Often also the mole burrows quite close to the surface of rich, loose soil which has been ploughed, and sometimes runs along it, forming merely a groove or trench.

THE MOLE AND WATER MYSTERY.

This theory of the mole as a confirmed teetotal tippler is held indisputable by all competent naturalists, and it is as true of the American variety as our familiar friend, the *Talpa europaia,* of this country. They have this in common also, that all varieties of moles are expert swimmers, take to the water freely, and have been known to swim nearly 100 yards. In 1890, however, a rude shock was given to the theory by no less an authority than Mr. W. H. Hudson, the very distinguished naturalist. In a charming book, "Nature in Downland" (Longmans, Green, and Co.), he gave a description of his rambles over the Sussex Downs, and he therein stated (pp. 77-80) that in that part of the country moles subsisted for several months of the year without water, for they could not obtain it, dig down ever so deep. I know many large tracts of these downs, and am fairly (for a non-expert) familiar with the geology of the land. That surface water or water close to the surface is sadly lacking, and, in fact, totally absent, in the summer and early autumn months, is true. But is it not possible that Mr. Hudson did not get down to "the bottom facts," as it were, of the subterranean mole supply? I think so; at least that is a more feasible theory than the alternative one, that the moles of the Sussex Downs have through many ages become acclimatised to the almost total want of water.

PRACTICAL USEFULNESS OF MOLES.

When I was employed as a boy on a farm in Ayrshire, one of my duties in spring time was to scatter the "mole-hills," especially on the rather poor lea-land. My "master," who, in many respects was an agriculturist far in advance of his age, would not permit professional or amateur mole-catchers to destroy these animals, believing, as he did, that they worked for good in loosening the subsoil, while the fine mould thrown up formed an admirable kind of top-dressing. Neither can I for my own part see what injury moles can do in forests. At all events, I am very familiar with many of the best German books on sylviculture, and I cannot recall to mind, not even in Professor Hess's great "Der Forstschutz," any information as to the protection of trees from the

"ravages" of moles, such as in the case of rabbits, squirrels, voles, mice, hares, &c. Of course, in a highly cultivated garden I could understand moles becoming worse than a nuisance, but not otherwise; therefore, my advice is: *Don't* exterminate moles.

RUBBER VINE CULTIVATION IN THE BAHAMAS.

Mr. Henry D. Baker, American Consul on Special Service in India, has furnished us ("Tropical Agriculturist," Ceylon) with a copy of the daily consular and trade reports issued by the Bureau of Foreign and Domestic Commerce Department of Commerce and Labour, Washington. Among the several articles there is an account on "Rubber Vine Cultivation in the Bahamas" by Mr. Baker. He says that plans are pending for an extensive cultivation in the Bahama Islands of the rubber vine known as *Cryptostegia grandiflora.* A 500,000-dollar syndicate, having this object in view, was organised several months ago in Boston, and about 1,100 acres of land have been purchased near the city of Nassau, in the Island of New Providence. A large number of shoots to be planted over this land will shortly arrive from Mexico, and special machinery for extracting the rubber and fibrous by-products by a secret process has been ordered from the United States.

It is understood that approximately 5,000 rubber vines will be planted to the acre. After six months' growth, the rubber vine is said to be 12 to 30 ft. long. The vines will be cut in about 12 months, when there will be presumably 2 lb. of shrub to the plant as a minimum, yielding about 2 per cent. of rubber or 200 lb. of rubber to an acre.

EXTRACTION METHODS AND VALUABLE BY-PRODUCTS.

The rubber juice is contained chiefly in the lactiferous ducts of the bark, but to some extent also in the wood of the stem—in fact, the entire plant contains a certain amount of rubber. While the process of extraction is secret, yet in the main it appears that it is analogous to the production of sugar from sugar-cane, the rubber vine being ground up and the juice extracted as from sugar-cane. Samples of rubber thus obtained from the rubber vine are estimated as worth in the London market within 8 cents per lb. of the price of the best Para rubber.

The fibrous by-products of the rubber vine are considered as possessing an importance possibly greater even than that of the rubber itself. The bark of the vine yields 6 per cent. of the weight of the whole stem in a pure cellulose fibre, undignified and having silky lustre comparable to Japanese ramie fibre and almost equal to cotton. It is thought that it can be used as a substitute for Egyptian cotton, especially in the manufacture of fine underwear and other textile goods. The pods of the rubber vine, besides containing a fair percentage of juice, have large quantities of a silky cotton, such as would be suitable for stuffing pillows; when refined and specially treated, it can be successfully spun with ordinary cotton. There are 5 to 10 pods to each shrub. The woody substance of the rubber vine when bleached and worked out yields a fibre suitable for paper pulp. The vine can be best harvested after the fruiting period.

THE DATE PALM.

Date palms have thriven and fruited well in various parts of Queensland for over a quarter of a century. Unlike most tropical fruit trees, the date palm is very accommodating as far as climate is concerned. Some of the finest dates we have tasted were from a tree grown at Miva, 4 miles from Kilkivan Junction, 65 miles south of Maryborough, in latitude 26 degrees South. Again, we find numerous date trees bearing good fruit at Helidon, in 27.30 degrees South, and only 25 miles from the City of the Plains (Toowoomba), where the frosts are every winter, severe, and where once, if not oftener, a snowstorm was experienced. The largest number of date trees fruiting in any district is at Barcaldine, on the Central Western Plains, 358 miles inland from Rockhampton, and situated almost on the latitude of the Tropic of Capricorn. Still farther north the date palm tree is found in many districts as far as Cooktown in a little over 15 degrees South. The climates of these widely separated localities differ in a marked degree, both in temperature and rainfall. In the Northern sugar districts the rainfall is very heavy and regular, and the temperature never rises or falls to extremes; whilst in the Far West the rainfall is very slight, and the climate hot and dry. West of Brisbane, as at Helidon, the summer heat is equable; but the mercury falls frequently below freezing point in winter. In the Maryborough and Wide Bay and Burnett districts, generally, the climate and rainfall are more equable than in the North or South-west.

It has, however, been abundantly proved that the date palm will thrive in all the sub-tropical and tropical parts of Queensland; that it fruits abundantly after five years; and that the fruit, when the variety planted is a good one, is equal to any of the imported dates. In Vol. XXIII., July, 1909, we depicted a single spray of the fruit grown by Mr. W. C. Wilson at Miva. In Vol. XII., May, 1903, we mentioned a bunch of fine dates we received from Mr. Gray, which he grew at Sandgate, within 50 yards of the sea, near Brisbane. The tree which bore it was twelve years old, and was grown from a seed. Numerous suckers were cut off, and, unfortunately, destroyed, as these suckers would have borne fruit in five or six years; whereas trees grown from seed take from ten to twelve years to bear, and they may possibly turn out to be all male trees. There is a method of changing the sex of date palms which we will describe further on. Mr. Gray's palm bore several fine bunches in the year mentioned. We ourselves have a date palm grown from a seed sown ten years ago, and as yet there is no sign of fruit. Several date trees we saw at Mr. Cronin's farm, near Barcaldine, were laden with fine fruit at the time of our visit in February, 1903. In the town gardens of Barcaldine there are several date trees, notably those in Dr. Cook's garden, who had a magnificent show of palms laden with the golden fruit growing close to the ground. Two of these trees were illustrated in the March issue of the journal for 1903. This Western country is especially adapted to date culture; and if date palms had been planted in quantity ten or twelve years ago, Queensland could have supplied the whole of the Australasian demand for the fruit, which is now imported.

Mr. Paul B. Popenoe, Altadene, California, who kindly sent us a reprint from the "Monthly Bulletin" of the State Commission for Agriculture of a paper by himself and discussions thereon, has made a special study of the date palm. We extract from this pamphlet the following interesting information on the subject:—

"The requirements of the date palm are—Intense summer heat, long continued; absence of summer rain; and abundance of irrigation. Under these conditions it can endure a fair amount of cold in winter, and alkaline soil or brackish water, without discomfort. North African varieties, which are those mainly grown at present, prefer a good sandy loam; but some of the Persian Gulf dates do better in a clay or adobe.

PLATE 135.—EIGHT-YEAR-OLD PLANTATION OF DEGLET NOOR DATES IMPORTED FROM ALGERIA, NOW IN THE WEST INDIA GARDENS, ALTADEN, CALIFORNIA.

"The palm is usually propagated by offshoots, which will begin to bear in three or four years, and continue profitably for a century, reaching their greatest vigour at the age of fifteen or twenty years.

"The offshoots are taken from the parent tree when they reach 15 or 20 lb. in weight, and are set in nursery rows until rooted, which will require nearly a year. They must be kept in moist ground constantly during that period—one day of drought during the hot summer may destroy the tiny roots in formation, and leave a dead offshoot. When rooted, they are transplanted to the open ground, 30 or 40 ft. apart, and require little care except frequent irrigation and cultivation.

"The only part of the culture which involves much labour is pollination of the female blossoms in the spring. This is done by cutting

off a male blossom, shaking it over the female, and tying it in place where the pollen can fall naturally. By this means, one male will supply enough pollen for fifty or more palms, while, if the wind and insects were depended on for the fertilisation, the number of each sex would have to be nearly equal. This fertilisation, however, is not a task that requires any great skill.*

"Beginning with the fourth or fifth year, the palm will produce a small amount of fruit. The Deglet Noor—the best of the varieties—is more precocious than others. It will not reach full bearing for some years more, and, even then, a part of the clusters are always cut off each spring to prevent overtaxing the palm. Eight or ten are enough to leave, and the yield should average nearly 100 lb. per tree. Yields of 500 have been reported, but 1 cwt. must be considered satisfactory. This will continue for a century or more.

"ARTIFICIAL RIPENING OF THE FRUIT.

"The discovery of the means to ripen the fruit artificially is the greatest boon given to the industry, and this alone, perhaps, has made possible complete success in California; for, if the berries ripen on the tree, they do so unevenly, and the waste from this source and from untimely rains, fermentation, and depredations of insects is enormous, in some cases having reached 90 per cent.

"With artificial maturation, however, the dates are picked when they have reached full size, but before they have begun to soften, and are placed in an oven or incubator filled with vapour, for eighteen or twenty hours, when they come out fully ripe and in perfect condition to be packed, shipped, and eaten. This method is the result of long experimentation by agents of the Bureau of Plant Industry and the University of Arizona, and is so inexpensive that it can be applied profitably to even the cheapest varieties. It allows all the dates on a cluster to be harvested at one time, and leaves them intact and not sticky.

"CHANGING THE SEX OF DATE PALMS.

"The inhabitants of the southern oases in Algeria maintain that this can be readily done. Of 100 date palms, 80 are male trees; hence it may readily be conceived that it is greatly to man's interest that the cultivator's intervention should be crowned with success. The method consists of tearing off all the leaves from the footstalks at two or three years of age, so that the medial nerve is split in two from the centre to the leaf sheath. The idea of the Arabs is that this tearing process brings on a concentration of the sap movement in the same way as in the case of an annular incision, and results in an accummulation of sap, which is more necessary for the vital functions of the female plant than for those of the male. No objection, from a vegetable pathological point of view, can be raised against the above assertion, for the reason that, in young plants, the organs are not yet different from each other.—"Q.A.J."

* *See* "Queensland Agricultural Journal," March, 1901, for explanation of the method adopted in the Sahara Desert of Africa for irrigating, fecundating, and generally treating the date palm.

"THE PROFITS OF DATE-GROWING.

"Finally," writes Mr. Popenoe, "a few words on that important subject, the profits that are likely to accrue to growers. . . . the date industry offers large enough returns to suit any reasonable man, particularly as the cost of operations is less than with most fruits.

"The lowest estimate of profits ever made is 150 dollars (£30) per acre a year, but with the decrease in waste, consequent upon artificial maturation, this old figure may stand as an irreducible minimum. Under present conditions, a plantation of good varieties under careful management should net several times that much per acre. The Deglet Noors, which were put on the Los Angeles market last fall, brought I dollar (4s. 2d.) per lb., netting the grower 79 cents per lb., or about 35 dollars (£7) per ton. In Algeria the grower of Deglet Noors thinks he is doing well if he gets 5 dollars (£1) per tree. . . . It seems reasonable to suppose that, for some years, Deglet Noor, and other dessert varieties, put up in an attractive way, will bring from 30 cents (1s. 3d.) to 50 cents (2s. 1d.) per lb.; while coarser varieties, or second-grade berries, will perhaps retail at from 15 cents (7½d.) to 30 cents (1s. 3d.) per lb.

"With forty or fifty trees to the acre, and an average yield of 100 lb. per tree, I believe the man who grows dates, with proper knowledge and attention to his business, can look for a profit of at least 400 dollars (£80) to 500 dollars (£100) per acre per year for a good many years to come."

DATE PALM SCALES AND THEIR CONTROL.

In the second volume of the "Monthly Bulletin" of the State Commission of Horticulture, Sacramento, California, No. 5, May, 1913, which is devoted to the "Descriptions, Life Habits, and Method of Control of Insects, Fungoid Diseases, and Noxious Weeds and Animals, especially in their relations to Agriculture and Horticulture," we find the following paper by W. E. Wilsie, County Horticultural Commissioner, El Centro, California, on Date Palm Scales:—

It is not generally known, but, with the introduction of the edible date into this State, there were also introduced two of their enemies, date scales, *Parlatoria blanchardii* (Targ.) and *Phœnicococcus marlatti* (Ckll.).

Little could be learned about these scales in their native home, only that they were present. What amount of damage was really done by them was for some time, and in a degree still is, a matter of conjecture, but the longer it is studied the more serious it seems to be. No natural enemies have ever been found, and it was necessary to resort to artificial means to keep them in control.

In the case of the *Parlatoria blanchardii* no remedy was entirely successful for more than temporary control until after the San Francisco fire, when it was found that ornamental palms withstood the tremendous heat and put out new leaves at once after the fire.

The burning remedy was then tried on the Tempe date garden in Arizona with success, and later many trees were entirely cleaned by this treatment; the method being to defoliate the tree completely to the stump, which is burned over with a gasoline torch.

The *Phœnicococcus marlatti* has been even more persistent than Blanchard's Scale, for the reason that it works behind and at the base of the leaves, out of sight and out of the light. Little is known of the life history of this scale, but it is certain that its work is done upon the vital parts of the plant. Palms, different from ordinary trees and shrubs, grow from the base of the leaf—the whole leaf being pushed out. It is on the tender new growth at the base that this scale, a sucking insect that covers the entire tender surface near the heart of the plant, feeds. The fruit stalks, through which all the nourishment for from a few pounds to as much as 75 lb. of fruit must pass, are, when young, exceedingly tender and brittle. Upon these the scale becomes so thick as to cover the entire surface.

Many remedies have been tried to eradicate this pest without success, for any treatment that was effective on the scale injured or killed the plant. Many plants were killed by the experiments. The first remedy that has given even a ray of hope was a preparation or solution compounded by W. T. Taylor, now of the Sun Drug Company of Los Angeles, for mealy bug. This solution was tried early last spring, and different series of experiments were carried on during the summer on both Blanchard's and Marlatt's Scales with a degree of success that is almost unbelievable after the experience with other treatments.

We are now able to kill both scales without injury even to the fruit on the tree. Trees have been treated during the pollinating season, and the solution sprayed in large quantities on the fruit just forming with no bad results.

Having proven that a remedy had been found that was effective without injury to the plant, it was a matter of detail to work out a plan whereby all the scales could be reached by the solution. At the present time, for offshoots a vat is used that will hold a number which are immersed for a short time. This treatment is repeated a few hours later. Nearly all the scale are killed by these two treatments, but not all. In some cases air bubbles form so that the saturation is not complete. In other cases the fibre is drawn so tightly that small spots will occasionally escape treatment, and on these dry spots enough live Marlatt's Scale will be found to give a good start again. In the case of Blanchard's Scale on the offshoots some of the leaves will be folded so closely that all parts are not wet, and so occasionally one of these is left unharmed.

At present, offshoots, treated in this way, are placed in nursery rows under quarantine for twelve months. This is done to watch developments. What the future regulations will be can only be determined by the results of our experiments. The future plans are not definitely worked out, but from experiments thus far carried on it seems reasonably certain that these pests need never give any serious trouble.

SMALL RURAL INDUSTRIES.

MINT CULTIVATION.

By JOSEPH KNIGHT, in the "Journal of Agriculture, Victoria."

Mint (*Mentha*) includes the Penny-royal (*Mentha Pulegium*), also Spearmint (*Mentha viridis*), which is cultivated for culinary purposes, besides other species. Our business here is with the plant commonly known as Black Mint (*Mentha piperita*). From this is produced the well-known Oil of Peppermint, which is largely used in medicine, confectionery, and in the manufacture of cordials.

Black Mint is cultivated largely in England and other countries for the extraction of oil; it is a hardy plant, loving a cool moist climate and a free soil. It thrives well on the hillsides in Gippsland and similar situations, is easily managed, and gives good return for labour bestowed on it.

The following is a brief description of its cultivation and treatment:—

Planting and Cultivation.

The plant used to establish a crop consists of pieces of the stolons or runners taken from the parent plant; like most of the "Mint" tribe, it is very prolific in producing these runners. Slips with three or four joints are sufficient—they should be well rooted, and the stronger they are the more prolific the first year's crop will be. The runners are planted out in well-prepared soil, and should stand about 15 to 18 in. apart from plant to plant each way. The land should be clean and free from weeds, as the distillation afterwards of the produce renders foreign matters undesirable. Care with the first crop will save much trouble in future working, as the plant, when once established, will, to a large extent, protect itself from any intrusion of weeds.

Fairly deep cultivation is necessary. The plant is chiefly a surface feeder, but requires some depth of soil in order to obtain the best results. The land should be well worked to a fine tilth and smooth surface, otherwise the cutting is difficult. Little in the way of cultivation can be done after planting, but the soil round the crop may be kept stirred with a fork, so as to give the young plant freedom in pushing out its runners for the summer cutting. In some cases, in fairly level land and dry situations, furrows are run between the rows and water run down; but where there is danger of "scour," this must be avoided. Light forking will materially assist the plant in its development prior to cutting.

The sets may be dropped in a shallow furrow and the soil turned down with a plough at the distance decided upon, but the land must be left with a level surface for the reason stated above. The time of planting must depend largely on the parent plant, as the runners have to be taken from the season's growth, and it is undesirable to rob it to the extent of impairing its yield for the coming harvest. In Gippsland and other timbered localities early in November would be time enough

in ordinary seasons. If the treatment of the soil has been suitable, there should be a fair cutting in March, and this may be treated for oil extraction straight away. The yield should then be sufficient to meet the expenses of labour for the first year's working.

After cutting the first year, the plants are, in some cases, covered up with a little loose earth, which gives them a start in making runners for producing the second crop. When the plants have been set out at a sufficient distance apart, a cultivator should be worked between the rows. It will be found more economical to arrange this distance and employ horse labour than to work by hand. After the second cutting, the land may be ploughed and the plants covered, and being well established they will stand rough treatment as far as the cultivation is concerned; this applies to all subsequent seasons. It may be found advantageous to renew the plantation every five or six years, as new fields will be found to give better results.

Harvesting.

The time of harvesting cannot be definitely stated, but the crop should be taken in full bloom. This is usually late in spring or early in autumn. The crop is usually cut with a hook, sometimes with a short-bladed scythe, frequently with a nipping machine; it is gathered in rows, then placed on sheets of hessian, and carried direct to the still. While many allow it to dry somewhat, asserting that there is no loss of oil, but only moisture, in the evaporation, others again claim that this is a mistake. It may not always be convenient to distil the whole crop in the green state; but there is no doubt that, where this can be done, it is advisable to do so. Whatever is done, care must be taken to prevent self-heating of the produce, which readily occurs if it is kept in heaps while green; and it must not be permitted to get wet by rain and become mouldy, as the oil is affected thereby, both in quantity and quality.

After Treatment.

The bulky nature of the mint crop necessitates the treatment of it on or near the place at which it is produced. For this purpose, a fair-sized still is necessary—the size must be regulated by the amount of crop. A 400-gallon still will be sufficient for 20 acres or so. The cost of the still depends on the nature of the material employed, and other such conditions.

The late Mr. Slater, of Mitcham, Victoria, who was a successful grower of plants for essential oils, and who had considerable experience of these in England, carried out his distillation work with the ordinary iron malt tanks—400 gallons each—which he found to answer the purpose well. A tank was set in on bricks (roughly) in such a way as to admit of a fire being placed underneath. The whole of the top of this tank was movable, and in it was fitted a cage lined with wire netting to hold the material. This cage was let down into the tank, which was filled with water. The lid had a goose-necked cone to convey the steam and oil to another tank holding the condenser, which was simply a spiral of tin-lined copper piping. The lid of the first tank was made

to screw down tightly on a rubber ring, in order to prevent any escape of steam, except through the condenser. The second tank was open, and contained the condenser only; and as a stream of water was not available to run into this, a third tank was employed to supply a current of cold water to keep the condenser cool. A steady stream of water was delivered to the bottom of the condensing tank, which, of course, as it heated, rose to the top and found its way to the overflow.

These simple and inexpensive appliances answered the purpose, but where a more elaborate outfit is desired many of our coppersmiths can supply it. Messrs. Dondey and Testro, South Melbourne, have a very convenient still, made of the latest pattern, and no doubt will be reasonable in their charges. Their experience in still-making should be a warranty that a suitable article will be supplied.

The treatment of the various plants from which oil is extracted by distillation is carried out in the same manner as the product now under consideration. There is one thing very necessary when changing from one product to another—a thorough deodorising and cleaning must take place, otherwise much of the product will be destroyed.

Distilling.

This operation is looked upon as being somewhat difficult, but it only requires a little practice to get good results. It may be mastered by the most inexperienced person with a few trials.

The oil contained in the leaves and stems is lighter than water, and it has also a lower boiling point. When heat is applied, the oil rises and passes off with a little steam before the boiling point of the water is reached. The finer and better part of the oil escapes first, and here it is that care and skill are required to make the most of the product and to secure a first and second quality of oil.

The steam, water, and oil which pass through the condenser referred to pass out through the lower portion of the cooling-tank into a receiver known as the "Florentine." This somewhat resembles a teapot without a handle. The oil and water dropping into the top of the receiver separate, the oil floating on the top, whilst the water escapes slowly at the spout. As the outlet is at the bottom of this receiver and the top of the spout a little below the mouth or level of the receiving portion of the "Florentine," the water and oil are separated.

One mistake frequently made is in forcing the distillation. The boiling should be slow, so as to avoid forcing over objectionable matter. A tank of 400 gallons should be allowed four or five hours to boil; after the first two hours the receiver should be changed, as the oil to follow is of secondary quality, and should be marketed separately. It is said that whatever oil the stalks contain is inferior in quality, and, being the last to be driven off, the heat must be regulated and the boiling a simmer only.

In distilling, it is much preferable to heat the water in the boiling tank with superheated steam, as it is more under control. This is done by having a steam generator close by and running steam through a perforated coil placed in the bottom of the still. The heat can then be

regulated to a nicety. Some eucalyptus distillers run hot steam through their leaves without water, but this does not meet with general approval for the finer essential oil plants. When applying direct heat, greater attention is required than in using steam.

Yields and Prices.

A good crop of well-established mint will yield from 5 to 6 tons per imperial acre. As to the yield of oil, some growers give 3 to 4 lb. per ton, whilst others state 5 to 6 lb.; nothing definite can be given in this respect. At the Dunolly and Leongatha Government Scent Farm mint was the last crop to receive attention, and it was not sufficiently established to give any reliable data to quote from.

Extract from the Royal Commission's Report on Vegetable Products.

(Evidence given by the late Joseph Bosisto, Esq., C.M.G., M.P.)

Now peppermint will grow on loamy and moist lands, and grow in abundance; but, like everything else, it wants proper gardening, taking care of, and keeping free from weeds. Its habitat is in loamy and moist lands. If this be neglected, it will soon lose its fragrance and flavour. The districts of Melbourne, Mount Macedon, and North Gippsland were tried, and that from North Gippsland was the best. Even in England the qualities vary in value; thus Mitcham oil realises 40s. per lb., while Cambridge brings only 33s. per lb., American 16s. per lb., and French 10s. per lb. I sent home to London a large quantity that I myself distilled, but other persons grew. I offered to distil it free, provided they would supply me with the material, and many of them did so—four or five—and here are the reports which I received from home relative to the peppermint. I forwarded several samples, together with the following letter:—

"I herewith send you a sample of an essential oil of peppermint, distilled from the green and cultivated plant grown in the mountainous districts of Victoria, with a request that you will favour me with an opinion as to its quality and marketable value if forwarded in large quantities."

Here are the reports. One is from W. J. Bush and Company, one of the largest essential oil buyers in England—

"We consider it very good quality—about equal to our Cambridge mint. We had submitted to us lozenges (Meggeson and Company), three kinds: one lot containing Mitcham oil, another lot containing Australian, and another containing Hatchkiss' (America). We picked out those made with the American at once as the worst, but were wrong with the other two, for we judged the Australian oil-made lozenges to be the Mitcham and *vice versâ*. We think 25s. to be an outside price to be expected at first, but will afterwards improve in price. There is a herby flavour about it that may be got over by cultivation."

Messrs. Price and Hickman report—

"We have examined the Australian oil of peppermint, and consider it to be of excellent quality, and but little inferior to Mitcham oil.

If it could be produced a trifle less yellow in colour, we have no doubt we could dispose of it in this market at about 27s. 6d. per lb. In its present state, we think it would be worth 25s.''

Another firm report—

"It certainly is the best foreign oil we have seen; but still it is foreign, and we doubt if at first it can compete with the English. We think it will soon take a high place.''

Now Cambridge mint is the second quality, only second to the best Mitcham.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug. 1913.	Aug. 1912.
North Coast.	In.		In.	In.
Atherton	0·98	11	0·3	1·08
Cairns	1·47	25	0·18	2·89
Cardwell	1·20	25	Nil	1·12
Cooktown	1·31	25	0·3	1·68
Herberton	0·65	25	Nil	1·30
Ingham	1·55	20	0·4	0·66
Innisfail	5·54	25	0·91	3·39
Mossman	1·58	5	0·47	1·98
Townsville	0·48	23	Nil	0·17
Central Coast.				
Ayr	0·59	25	Nil	0·4
Bowen	0·79	25	Nil	0·18
Mackay	1·27	25	Nil	0·33
Proserpine	0·85	10	Nil	1·43
St. Lawrence ...	1·23	25	Nil	0·38
South Coast.				
Crohamhurst ...	2·37	20	0·6	1·35
Biggenden	1·27	14	0·2	...
Bundaberg	1·66	25	0·2	0·78
Brisbane	2·32	62	0 2	1·32
Childers	1·42	17	Nil	1·06
Esk	1·85	25	Nil	1·13
Gayndah	1·29	25	Nil	0·68
Glass Mount's ...	...	...	Nil	1·14
Gympie	1·74	25	0·8	0·92
Kilkivan	1·46	25	Nil	0·48
Maryborough ...	1·63	25	Nil	1·26
South Coast—continued:	In.		In.	In.
Nanango	1·62	25	0.9	1.52
Rockhampton ...	1·05	25	Nil	Nil
Woodford	2·19	25	Nil	0·96
Yandina	2·34	19	Nil	1·25
Darling Downs.				
Dalby	1·24	22	Nil	1·12
Emu Vale	1·36	17	Nil	0·82
Jimbour	1·41	24	Nil	1·50
Miles	1·28	25	Nil	1·06
Stanthorpe ...	1·69	22	Nil	1 65
Toowoomba ...	1·74	22	Nil	1·05
Warwick	1·61	22	Nil	1·37
Maranoa.				
Roma	1·02	21	Nil	0·77
State Farms, &c.				
Gatton College ...	1·49	14	Nil	1·04
Gindie	0·74	13	Nil	Nil
Kamerunga Nurs'y	1·54	23	0·27	...
Kairi	...	...	0·18	...
Sugar Experiment Station, Mackay	0·84	16	...	...
Bungeworgorai ...	...	...	Nil	0·33
Warren	...	...	0·17	...
Hermitage ...	1·90	7	Nil	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Entomology.

WHITE GRUBS IN SUGAR-CANE FIELDS.

[A Memorandum by Claude Fuller, Government Entomologist, Natal, to the Natal Sugar Association, May, 1912.]

The following interesting paper on the sugar-cane beetle and grub by Mr. Fuller will be doubtless much appreciated by sugar planters, although belated in this journal. Singularly enough, the writer deals with the subject of the danger of planting, or allowing to remain near sugar plantations, the wattle tree; and as will be shown, Mr. W. T. Paget (now the Hon. W. T. Paget, Minister for Railways), who, with his brother, in 1899, owned the Nindaroo Sugar Estate, near Mackay, voiced the same opinion fourteen years ago at an Agricultural and Pastoral Conference in June of that year.

Mr. Paget, on that occasion, stated that, at Nindaroo, in the blady grass forest country, the cane grubs were very numerous, and that they originated in the *forest*—not in the scrub—lands. The reason, he said, that so many beetles were found on scrub lands was that they were especially fond of certain trees which grew on scrub lands; and when fields were surrounded by standing scrub badly affected by grubs, the result was that the beetles congregated on the scrub timber in preference to the forest. Mr. Paget's opinion was that, if the beetles could not get, say, "parrot-bush," they would take to the fig-tree or forest ash, or anything else they could get.

This opinion appears to be in accord with the dictum of Mr. Fuller, who wrote as follows on the subject:—

The literature bearing upon the cultivation of sugar-cane is pregnant with references to damage done by the grubs of cockchafer beetles, and yet this form of cane injury is practically unknown in Natal.

Despite the fact that there does exist in the province a wide variety of chafer beetles, several of which occur in swarms, especially two which have adopted the introduced wattle as a host-plant—viz., the Larger Wattle Chafer *(Hypopholis sommeri)* and the Lesser Wattle Chafer *(Monochelus calcaratus)*—complaints of the depredations of their young or grub stage are very few and far between. Indeed, I have only had three cases brought to my notice during my thirteen years' sojourn in Natal, and these have not been serious in their extent.

In one case the grubs were destroying numerous garden plants by eating off the roots, and in the other a grass lawn was seriously involved, the grubs practically undercutting the whole of the turf. In both these instances the infested spots were close up against wattle plantations, and it was not surprising, therefore, that when reared to maturity it was

found that the culprit was the larger wattle chafer. This insect originally passed its earlier stages in the veld and its adult or beetle form on native acacia trees. Nowadays it has become abundant because wattle plantations not only afford a wide feeding ground for the beetles, but also because the roots of the wattle provide suitable food for the grub, thus giving the insects every opportunity to increase and multiply without incurring any of the risks or accidents incidental to a search upon the part of the mother insect for a place in which to deposit her full complement of eggs.

In view of the fact that grass roots are, as a whole, the natural food of our native species, the presence of wattles near to cane plantations at once suggests an attack of white grubs upon cane, and I have no hesitation in saying that if not to-day, at least in the future, such is likely to be the natural course of events where wattles are so grown.

Whilst every agriculturist may not be familiar with cockchafer beetles, all are quite well acquainted with their larvæ, or as I term them, "white grubs." Despite the great variation in size and colour and even habits of the adult beetles, "white grubs" are all singularly alike. I have only to say that the most conspicuous of our local white grubs is that which is found in manure piles or heaps of rotting bagasse, for everyone to call to mind their familiar form. The helpless, white, bent bodies, ending in a swollen bluish hump, the hard, brown heads, and six long legs pawing the air helplessly as the creatures lie on their sides when turned out of the soil, are such well-known features that a detailed description is unnecessary.

The life-cycle of these insects is briefly that the female beetles place their eggs a little way beneath the soil and these soon hatch. The grubs feed upon the roots of the plants about, some sorts for a year, others for two, and others again for longer periods. When mature they construct little cells in the earth, changing there into pupæ, or chrysalides, and later into beetles; when the life-cycle starts again. The grubs generally go deeper into the soil to pupate, so that whilst when feeding they may be within a few inches of the surface they will subsequently be 16 to 18 in. down.

With these premises, I have now to draw the attention of planters to a case of "white grub" attack upon sugar-cane which was recently brought to my notice by Mr. Colin Campbell, at Mount Edgecombe.

So far as it has been able to ascertain the position, this attack is in the form of two patches which in the aggregate are probably not more than an acre in extent. The damage done was quite conspicuous, and if equalled over a large area would be ruinous. Measures were recommended, and a gang was put to work to hoe over the land and collect the grubs, then about 4 to 6 in. below the soil level. A large number were obtained, which have been estimated at 60,000—a pretty considerable amount, considering the comparatively small area infested. I need not hesitate, therefore, in saying, almost dogmatically, that the insect under discussion possesses vast potentialities for mischief, and that cane-growers

should be alert for its detection in the fields and adopt heroic measures for its eradication. In speaking thus I do not for one moment wish to appear as an alarmist. There is a possibility always that this form of insect attack has long been present in our cane-fields and its injury, confined to reasonably small areas, attributed to soil poverty or other unknown causes. At the same time this may not be so, and, consequently, I can candidly say that the risk is not worth taking—that is, the risk of the pest establishing itself in any given field and then, through neglect of one or two slight infestations, being allowed to spread and establish itself equally throughout a whole plantation.

When the first examination of the infested patches was made I was not able even to surmise what specific insect the damage was due to, but a subsequent investigation of the result of the treatment resulted in the finding of some adult beetles ensconced at a depth of 16 or 18 in. in the soil, where it is presumed they would remain until the bulk of the brood came to a like stage and issue from the soil in the spring. I say "would" advisedly, because no effort has been spared to rid the soil of as many of the insects as possible by collecting them.

From an examination of the beetles I can only say that it strikingly resembles that which is drawing so much attention upon itself in Mauritius at present. I am not prepared to go so far as to say that it is exactly the same species, but for all practical matters it can be regarded as the same.

Now, the beetle which is doing so much damage on that island has recently been described as *Phytalus Smithi*, and it also exists in the Barbados, where it is known as the sugar-cane "brown hardback."* According to a recent writer in the "Agricultural News," the official organ of the Imperial Department of Agriculture for the West Indies, the insect is not there regarded as a serious pest. This writer says:—"It is naturally of considerable interest that, while the brown hardback in Barbados is not recognised as being of any importance as a pest in that island, in another part of the world the same species should develop to such enormous numbers and should become a pest of such great economic importance."

In Mauritius, however, it has quite a different phase. In a report presented last year by the Government Entomologist of Mauritius (Mons. D. d'Emmerez de Charmoy) it is stated that over 300 acres of cane were involved at Pamplemousses, and "the extent of the damage done by the species will be understood when the number of larvæ per unit of area is calculated. We found in four-months-old virgin canes an average of ten grubs per hole—*e.g.,* 30,000 per arpent, reckoning 3,000 holes per arpent. Between the rows, and therefore in hard soil free from straw the number was 4,300 on a length of 400 ft. and a width of 4 ft., and 2,640 for the

* Mr. E. Jarvis, Assistant Government Entomologist, says that several Queensland species of Scarabæid beetles have been recorded as sugar-cane pests, the most formidable being *Lepidiota albohirta*, found in the Mackay district, where no less than 22 tons of these beetles were captured during the latter months of 1909. A species of *Rhopæa* has also proved very destructive in the Isis district.

same space in furrowed ground. This brings the total per acre to 36,940—say 37,000.''

More recent news concerning the insect appeared in "Agricultural News," from which I extract the following observations:—

"Since the time that this beetle was first reported, it has attracted attention from all parts of the sugar-growing world, on account of the very serious nature of the damage done by it, and also because of the fact that it is seemingly a new form, certainly new to Mauritius, and, up to the present time, apparently not identified in any published account of the insect.

"The enormous numbers in which these insects have occurred are shown in two letters which have been received by the Imperial Commissioner of Agriculture from a correspondent in Mauritius. In one of these, dated 15th December, 1911, it was stated that the adult beetles were being captured in large numbers, over 390,000 having been taken in a single night; a postscript added on the 19th of the month gives the record of 1,372,000 beetles taken in one night!

"The method adopted for the capture of the beetles is ingenious. This work is done by East Indians—men, women, and children—who stick small branches of trees into the ground in fields where the insects are known to abound. The branches, having the appearance of small shrubs, are placed irregularly, at no fixed distance apart; this may vary from 15 to 50 ft. At dusk the insects come out of the ground and settle on the branches from which they are collected by the Indians, who are provided with small hand lamps. The insects are taken to the officer in charge of the work, and are paid for at a given price per 1,000.

"In another letter from the same correspondent, under date of 28th December, 1911, the Imperial Commissioner was informed that the record capture of the season amounted to nearly 3,000,000 of the beetles in one night, while the total number for the months of November and December exceeded 25,000,000. During the latter part of December, however, there was a decided falling off in the number of insects taken, the last figures received being 275,000 for one night near the end of the month.

"It would appear from the information received that the collecting of the adults, especially towards the end of the year, was the control method on which the greatest dependence was placed; although it is possible that experiments with other methods may have been under progress and will be reported upon later.

"A question of very great interest in connection with the outbreak of the beetle in Mauritius is that of its identity, relationship, and original home. There seems to be no doubt that it is a recently introduced form in Mauritius, and the fact that it occurs in the vicinity of the gardens of Pamplemousses gives rise to the surmise that it may have been introduced among plants imported for the gardens."

It will be seen from the above that the insect is regarded as a more or less recent introduction into the Island of Mauritius, and the question arises whether or not it has also been similarly introduced into Natal.

Even should our species, when examined by a coleopterist, prove to be identical with *Phytalus Smithi,* as I take it to be, it will still have to be shown that it is an introduced species. If so, it must be conceded that it has been introduced many years ago, and not recently, otherwise it would hardly have made its first effective appearance when it did.

Assuming this to be the case, there are two possibilities—one, that the insect is only now sufficiently established or acclimatised to become noxious; the other, that it is under some form of natural control.

Presuming it to be a native species, this may be the first evidence we have of its adoption of the sugar-cane as a food plant, or that it is under natural control and has always been present, but to such a minor extent as to have been overlooked by cane-growers. There is one other possibility, and it is that the adult beetles feed naturally on acacias, and the introduction of wattle culture into our cane-belt has provided an opportunity for the increase of the species and the infestation of cane-fields, not previously existing to a sufficiently great extent.

Be it as it may, however, it is not worth considering any of these points from the practical aspect of the matter. We know the pest is present; we know that it can be destructive; and it is far better to treat it with suspicion, watch for it, and eradicate it as far as possible from the fields when found, than adopt a *laissez faire* policy and let things slide until, perchance, a large area is infested.

There is, unfortunately, no easy mode of dealing with white grub attack, and no more practical recommendation can be made in the present state of affairs short of digging over the land and collecting the grubs. For this reason alone it is necessary to make short work of the small patches found, for all will agree that what is a practical proposition over an acre is not so in a matter of 100 acres.

[The danger of planting wattle trees or allowing them to remain in the neighbourhood of sugar-cane fields has, as above stated, been noted in Queensland so far back as 1889. The method of trapping the beetles by East Indians might possibly prove equally successful in this State.

At a subsequent meeting of sugar-planters in Brisbane, to which the members courteously invited us, we suggested the introduction of the moles as a solution of the trouble. Much was then said for and against the mole as a grub destroyer. We therefore now republish an article on the mole and its habits, which appeared in this journal in December, 1907.—Ed. "Q.A.J."]

SISAL HEMP.

London quotations.—Sisal hemp, £34 15s. to £35 10s. per ton; Mauritius hemp (Fourcroya), £25 10s. to £27. A strong demand has prevailed for fine hemp, and very little is obtainable owing to all available lots being bought by American operators at higher rates. Any serious fresh demand should have the effect of considerably further enchancing values.

Science.

SCIENCE IN AGRICULTURE.

MENDEL'S LAW.

The term " Mendelism" occurs so frequently in the various articles published on the breeding of cereals and other plants, as well as on the cross-breeding of animals, that it is necessary to explain in as concise a form as possible the meaning of the term.

What, then, is Mendel's Law? It is chiefly concerned with the fertilisation of cross-bred organisms. George Mendel was an Austrian monk, born in 1822. After studying the natural sciences in Vienna (1851-3), he became interested in the problems of hybridisation, and on his return to his cloister he commenced his classic experiment on the eating pea *(Pisum sativum)*, and the results appeared in the " Proceedings of the Natural History Society of Brünn," under the title " Experiments in Plant Hybridisation" (1865). Mendel died in 1884.

From various reports, Bateson's "Mendel's Principles of Heredity," and in publications by the Rev. T. W. Sturges, M.A., vice-president of many poultry clubs, and author of several valuable works on " Poultry Culture and Breeding, &c., we take the following interesting explanation of Mendel's Law:—

" Mendel states that, like other investigators, he had been struck by the regularity with which offspring of certain hybrids reproduce the pure ancestral forms. But owing, as he supposes, to the complex nature of the cases studied, and to want of accurate statistics, the precise facts had never been ascertained. Accordingly, he set himself to work out some cases from which every confusing element should, as far as possible, be excluded (" Report 1 to Evolution Committee, 1902").

For this purpose he chose several varieties of a pea *(Piscum sativum)* as best suited to his purpose. In this plant the separate flowers are habitually *self-fertilising*, and are protected from insect interference. There are several varieties of the eating pea having distinct characters which breed true. The varieties differ in shape, colour of seed and pod, height, growth, &c. He thus chose pairs of varieties for crossing in such a way that the members of each pair differed from each other in respect of one definite character. Between these various pairs of varieties, crosses were then made, the female parent being emasculated. Thus, pollen from a pea of the round-seeded variety was transferred to the stigma of a pea of the angular-seeded variety, the stamens of the artificially pollinated flower being removed before they were ripe. The same was done in all the varieties named. In the experiment referred to above, the result was seen as soon as the cross-fertilised seed was ripe.

It was found that *all* the seed was round—none angular or wrinkled. With the other experiments it was necessary to plant the ripe seeds and grow the plants to maturity. On such examination it was found that, in the case of each pair of characters, *only one was manifested* in the cross-bred individual, to the total, or almost total, exclusion of the opposite character.

The character which thus prevails, Mendel calls *Dominant* (D); the character which is suppressed being *Recessive* (R).

Reciprocal crosses gave identical results—*i.e.*, the result was the same whether the pollen was taken from an angular pea or from a rounded one, or whether taken from the flower of a tall plant or a dwarf. Briefly, then, D × R or R × D gave offspring which, in appearance, were all practically D.

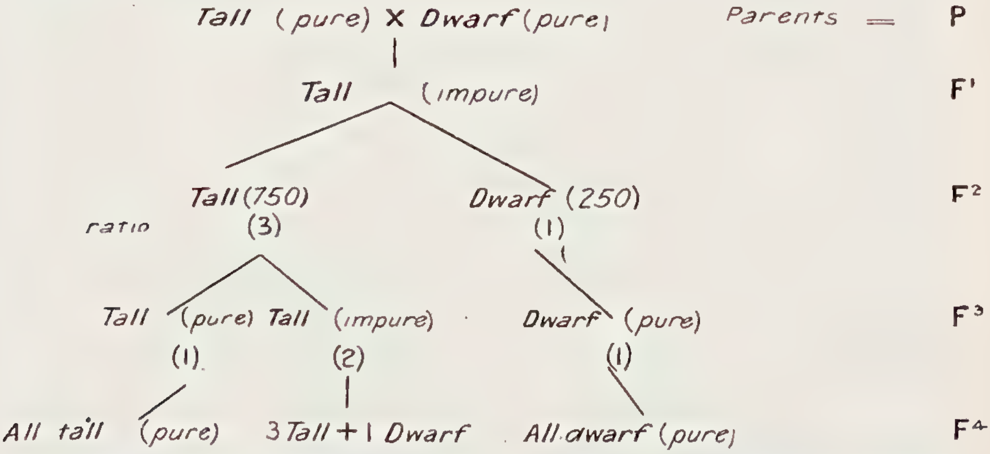
The next generation is obtained by allowing the cross-bred plants to fertilise themselves. The result of such self-fertilisation is, according to Mendel, that the next generation, instead of being uniform like their cross-bred parents, break up into their two original forms. This takes place in such a way that there are, *on the average,* **three dominants to one recessive.**

Take, as an example, the cross between the tall and the dwarf pea. It is of no consequence which is used as the male or pollen-producing plant and which the female; the result is the same. When the cross-bred seeds were sown, *all* the plants grew tall; there were no dwarfs and no intermediates. When the seeds from these tall plants were sown in the following year, it was found that both tall and dwarf plants were produced in the ratio of 3:10. There were no intermediates. In one series of experiments, Mendel obtained 1,064 plants, of which 787 were tall and 277 dwarfs—*i.e.,* the tall plants were about three times as numerous as the dwarf in the second generation. The tall plants were dominant (D), and the dwarfs recessive (R). [For convenience of reference, the parent plants are called P, the hybrids or first cross F^1 (= 1st filial generation), and the succeeding generations F^2, F^3, and so on.]

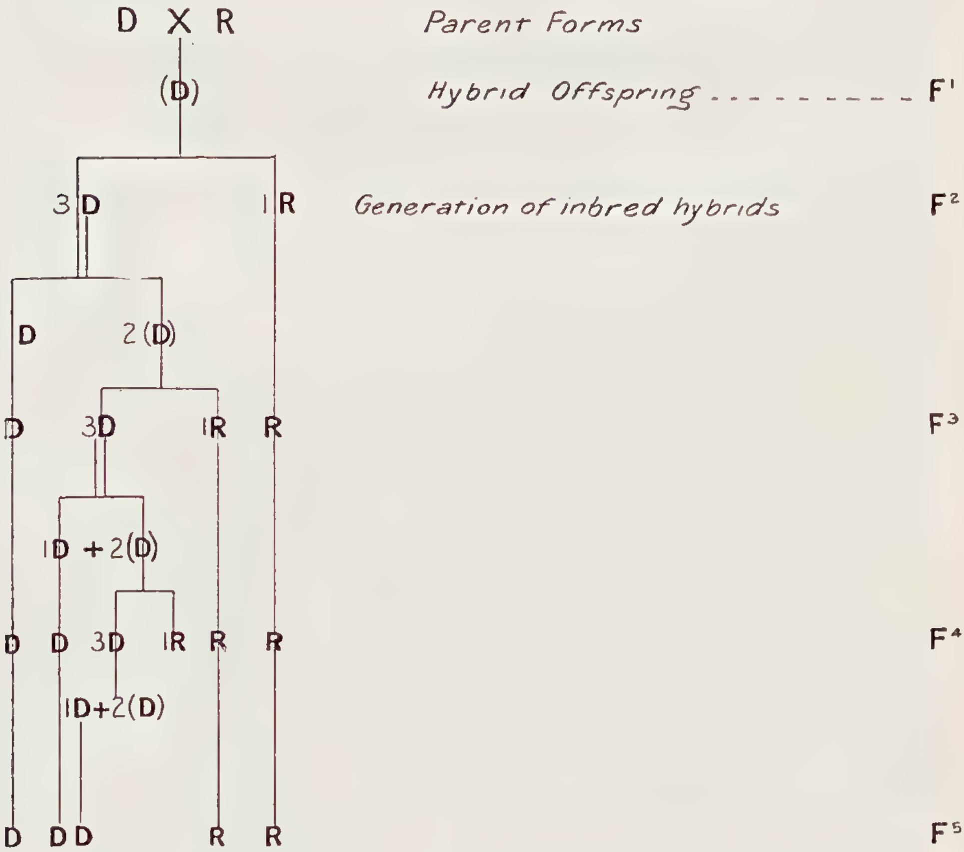
In the following year, the seed of this F^2 generation were sown. From the seed of the dwarf, *only* dwarf plants came. The recessives bred true to type, and, what is more, continued to breed true through any number of generations. The recessives are, therefore, not only apparently but *actually pure,* showing no taint of the cross so far as the contrasted pair of characters is concerned—*i.e.,* the recessive was all R, and no sign of D.

The tall plants, however, though all *apparently* pure D, were not all pure. Briefly, one-third of them produced seed from which sprang both talls and dwarfs in the proportion of 3 : 1. The tall plants of the F^2 generation were, therefore, of two kinds—those which carried *only* the tall character, and those which carried the tall and the dwarf. By breeding subsequent generations, Mendel found that the pure dominants and the pure recessives always bred true like their original parents (P),

while the impure dominants bred dominants and recessives in the constant of 3 : 1.



If we denote the pure dominant by D, and the impure dominant (which cannot usually be distinguished in appearance from the pure) by [D], and the recessive by R, we may construct the following scheme of inheritance:—



It will be noted that the 3D in the F² generation = 1D pure and 2D impure. The 3D's resembling the dominant parent are all apparently alike, but their subsequent history shows that they may be divided into a

set which breed true dominant type; and another set which behave like the first generation of hybrids, F^1—that is, they go on splitting up into dominant-like forms and pure recessives.

Mendel himself verified this principle of dominance for several characters of *Pisum,* finding not only tallness dominant over dwarfness, but round seeds dominant over wrinkled seeds, coloured seed coats dominant over white seed coats, yellow seed colour dominant over green seed colour, purple flowers dominant over white flowers. He interprets his facts as follows:—They point to the conclusion that, in the cross-bred, each of its pollen grains (or sperm-cells) and each of the egg cells, is either pure dominant or pure recessive, and that, on the average, there are equal numbers of each kind for each sex.

The Mendelian principles apply alike to animal and plant breeding. Professor Bateson says:—"No one acquainted with Mendelian method will doubt that, by its use, practical breeders of animals and plants may benefit. In so far as they are concerned with the fixation of desirable varieties, or with the creation of new types by recombination of pre-existing characters, their operations may now be greatly accelerated."

Mendelian discovery abolishes the old delusion that time and continued selection are needed in order to make a variety breed true. It will be seen that Mendelian method need watchfulness and care. They minimise labour for the thoughtful, but they do not abolish it. They both stimulate and reward intelligent observation; but they do not give us a "rule of thumb" method—a cheap and easy road to success. It is on these methods that wheat-breeding at the Roma State Farm is being conducted, through which true types of the most suitable wheats (and maize) for different parts of the State will be produced and eventually distributed throughout the land.

THE WORLD'S COTTON CROP RETURNS.

(In Thousands of Bales.)

Season.		America.	India.	Egypt.	Brazil, &c.*	Total.
1903-4	..	10,124	4,471	797	2,760	18,152
1904-5	..	13,555	4,061	843	2,172	20,633
1905-6	..	11,320	4,797	798	2,542	19,457
1906-7	..	13,550	5,197	926	2,803	22,476
1907-8	..	11,582	4,445	965	2,916	19,908
1908-9	..	13,829	4,779	910	2,885	22,403
1909-10	..	10,651	5,317	678	2,768	19,414
1910-11	..	12,132	4,587	984	3,036	20,739
1911-12	..	16,043	4,078	965	3,882	24,968

—"Tropical Agriculturist," Ceylon.

* Including all other countries.

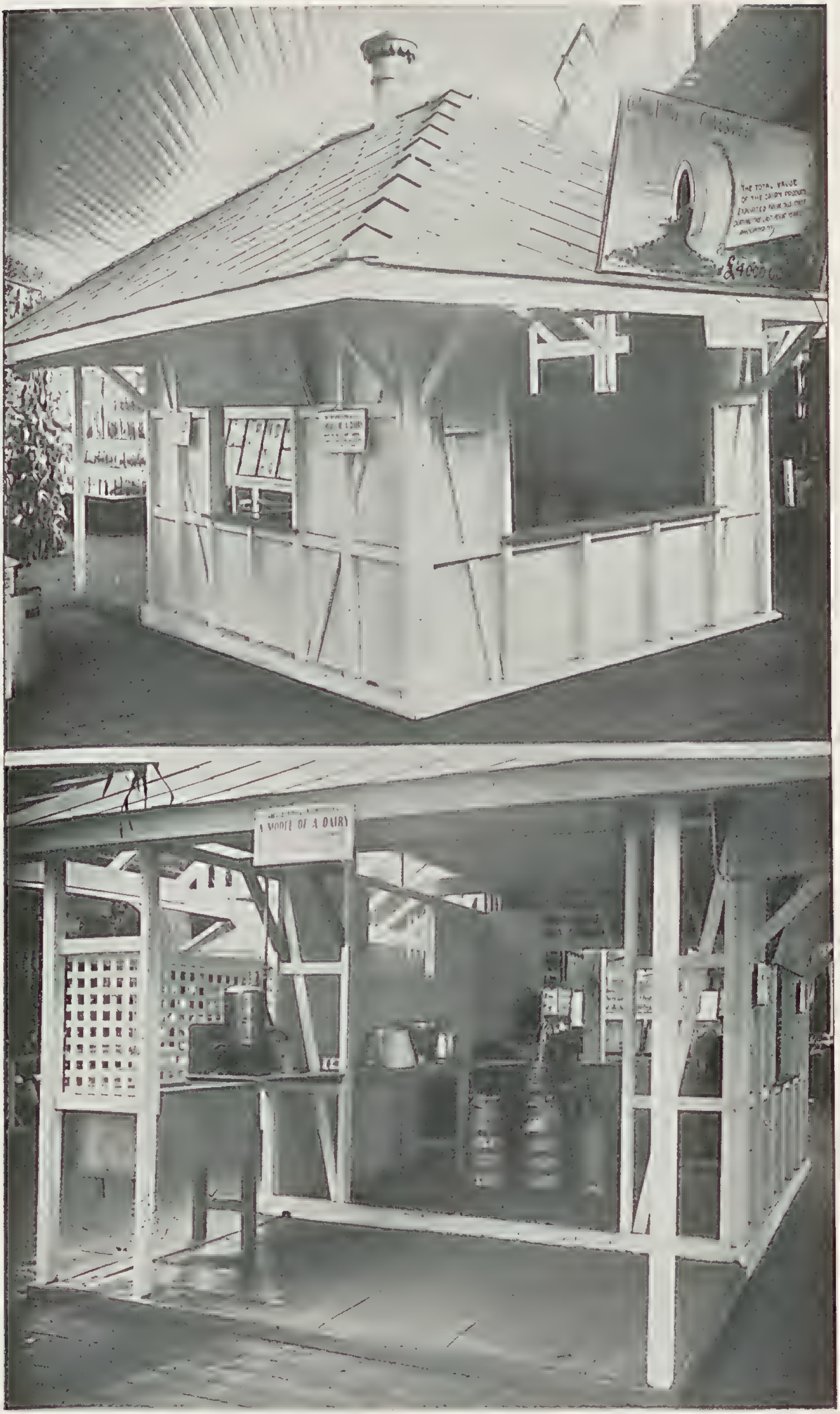


Plate 136.—Model Dairy, Interior and Exterior, Departmental Court, National Association's Exhibition, Brisbane, August, 1913.

General Notes.

THE RABBIT PEST IN TASMANIA.

As in other States, the problem of dealing with the rabbit pest has been occupying considerable attention by farmers and pastoralists in Tasmania for some time. The matter was some little time ago taken up by the local Farmers and Stockowners' Association, and at the recent meeting of the council of that body a special report was submitted by a sub-committee appointed to collect data and make recommendations. The report was a rather voluminous one, and among other things it was stated that information had been collected bearing upon the trade in rabbit skins in the States. The figures indicated that not less than 5,000,000 skins were exported from Tasmania each year, the value of which was under £50,000. As poison was now generally used for destroying the pest, it was quite safe to assume that as many more were killed, making the death-roll equal to 10,000,000. Add to that at least 2,000,000 left at the end of each winter to breed up again, the conclusion was arrived at that the lands of the State were growing every year 12,000,000 rabbits. Taking these figures as a basis, and allowing 15 rabbits to consume as much grass as one sheep, it was computed that bunny was occupying the place of 800,000 sheep, or, in other words, taking up about one-third of the lands, for which the State received under £50,000, as against the annual value of 800,000 sheep, which would be not less than £300,000 at a low estimate. The report continued:—

"Nor does the great loss end in lower carrying capacity, for science has demonstrated that the rabbit is the most active agent we have for the propagation and distribution of the parasitic diseases which are giving sheepowners so much trouble, such as intestinal worms and liver fluke. In this way the pest is responsible for enormous losses, partly by death and partly by weakened constitution and light fleeces of wool. Then, again, the means taken for fighting the pest commit the rural industries to the establishment of a fund representing an enormous amount of money, which might otherwise be used for the development of these industries. The effect, too, of the continual presence of the pest has been to practically ruin very large areas of what were once fine sheep country; for the finer grasses have been killed out, and wattles and other scrubs have in many parts taken complete possession. Your committee would therefore recommend that the following suggestions be sent through your association to the Minister for Agriculture:—(1) That in future careful records be kept of all rabbit skins exported from or used in the State; (2) that, in order to ascertain the effect of future dealing with the pest upon our sheep and cattle industry, steps be taken by the Stock Department to arrange for the compiling and publishing of statistics showing the position each year of our sheep and wool

industry and also of our cattle industry; (3) that, where a settler adjoining Crown lands is compelled to erect rabbit-proof fencing in self-defence, the Crown occupies the same position, under the Boundary Fences Act, as a private owner; (4) that statistics be compiled and published annually showing the comparative progress, if any, of land settlement."

The report was adopted after lengthy discussion.—"Dalgety's Review."

COTTON-GROWING.

The Minister for Agriculture and Stock has decided to invite farmers to resuscitate the cotton-growing industry in Queensland; and a circular has been sent to farmers in suitable districts stating the intention is—

1. To receive cotton during 1914 in the seed, on owner's account, at a central place—probably Ipswich or Brisbane.
2. To gin, bale, ship, and sell to the best advantage and in the best market.
3. Account sales will be rendered upon the arrival of each return of clean cotton sold; but, to prevent inconvenience, an advance up to 1½d. per lb. will be made upon cotton in the seed received at the depôt.

WHAT THE PROPOSAL MEANS TO THE FARMER.

The decision of the Minister to assist farmers in an effort to re-establish what was once, and still could be made, a paying business, should commend itself to all who possess suitable land, and who have the means at their disposal for harvesting a crop which is far simpler to handle than maize, tobacco, and many other such products. Given a minimum crop of 1,000 lb. of seed cotton per acre, the grower receives a preliminary payment of £6 5s. per acre, which can be picked at a cost of £2 1s. 8d. per acre, or ½d. per lb. If picked by the owner's family, so much the more gain. 1,000 lb. of seed cotton, when ginned, returns 400 lb. of clean lint, worth at present, for Uplands, about 7d. per lb., or £11 3s. 4d. The ginning of the cotton amounts to £1 0s. 10d. per 1,000 lb. Other incidental charges would be bales, cartage, freight, insurance, and commission. We base our calculation on a 1,000-lb. crop per acre, but 2,000 lb. is not at all an uncommon crop in this State, as was proved by Mr. Goos, of Tallegalla, who, in 1907, obtained 4,250 lb. of seed cotton from 2¼ acres; while Mr. Pointing, also at Tallegalla, produced 3,527 lb. from 2 acres; and Mr. Litzow's (of Vernor) crop amounted to 3,006 lb. from 2 acres. The value of these crops per acre amounted to from £11 13s. to £9 7s. 10d. Four farmers during that season planted 7 acres with seed supplied by this Department. The yield of seed cotton was 13,093 lb., and the value £81 7s. 3d., or over £11 12s. per acre. This would, in any other cotton-growing country, be considered a highly satisfactory return, and one which is always liable to an increase in price, depending on the scarcity of cotton in the market.

A SUBSTITUTE FOR SEAKALE.

A correspondent to an English gardening paper writes:—" To those who are fond of seakale and have not the means to grow it, the following hint may be useful:—Get some swede turnips and put them in a dark place with a temperature anywhere between 50 and 60 degrees. Stand them in a single layer, with the crown uppermost, and if the floor is damp they will need no soil around them; all that it is necessary to do is keep them perfectly dark. In a few weeks they will have long shoots on them similar to seakale, which may be cut and cooked in the same way. If a few roots are brought in each week, a succession may be kept. When properly prepared, it is not unlike seakale in flavour. White turnips may be treated in the same way."—" Garden and Field."

RAW COTTON CONSIGNED TO THE UNITED KINGDOM.

The following statement of raw cotton consigned to the United Kingdom from each British possession (except India) and from Portuguese East Africa during the years ending 31st December, 1909 to 1912, is compiled from figures supplied by the Statistical Office of the Custom House, London (in bales of 400 lb.) :—

	1909.	1910.	1911.	1912.
Gold Coast	98	30	24	14
Southern Nigeria	12,179	6,336	5,085	9,721
Northern Nigeria	186	74	168	1,061
Total West Africa	12,463	6,440	5,277	10,796
British East Africa and Uganda ..	4,255	7,811	16,866	26,831
Nyasaland	2,069	2,832	5,020	6,800
Portuguese East Africa	185	23	153	3,036
Total East Africa	6,509	10,666	22,039	36,667
British West Indies	5,479	5,385	8,407	7,337
British Guiana	—	—	1	—
South Africa	17	5	67	342
Australia	—	28	17	13
New Zealand	34	360	52	34
Sundries	93	3	687	474
Total Sundries .. — ..	144	396	824	863
Total Bales	24,595	22,887	36,544	55,663

Answers to Correspondents.

IRONWOOD WATTLE.

(ACACIA EXCELSA.)

Bristolian, Darling Downs—

The specimen forwarded is a form of *Acacia excelsa*, or ironwood wattle. The trees can be propagated from seeds. Put the seeds in a cup and pour boiling water over them. When the water has cooled, take out the seeds and sow in damp ground, always keeping the soil moist.

ARROWROOT, COWPEAS, ETC.

Canna, Maroochy—

The variety of arrowroot generally grown in Queenland, under the name of *Canna edulis*, produces large quantities of bulbs which contain from 20 to 30 per cent. of starch; 2,240 lb. of bulbs will yield from 450 to 675 lb. of starch; and the yield of starch per acre may be roughly stated as from 20 to 30 cwt. Reckoning 20 per cent. only as the yield of starch from the bulbs, 11,200 lb. of bulbs, or 5 tons, would be required to produce 1 ton of starch.

Cowpeas yield from 20 to 25 bushels of seed per acre; Russian sunflowers, 40 to 50 bushels; Japanese millet, 20 to 30 bushels.

STRADBROKE ISLAND.

Enquirer, Southport—

The highest point of Stradbroke Island is 739 feet above sea level.

Jas. K. Coutts, Eton Vale, Cambooya—

Thanks for your letter which is unavoidably held over until next issue of the Journal.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1913.

Article.		SEPTEMBER. Prices.
Bacon, Pineapple	lb.	$9\frac{1}{2}$d. to 10d.
Bran	ton	£5 10s.
Butter	cwt.	104s.
Chaff, Mixed	ton	£3 10s. to £4 10s.
Chaff, Oaten (Victorian)	,,	£6 10s. to £8 5s.
Chaff, Lucerne	,,	£5 to £6 5s.
Chaff, Wheaten	,,	£3 10s. to £4 10s.
Cheese	lb.	$6\frac{1}{2}$d. to $6\frac{3}{4}$d.
Flour	ton	£9
Hams	lb.	1s. $1\frac{1}{2}$d.
Hay, Oaten (Victorian)	ton	£5 10s. to £6 10s.
Hay, Lucerne (Prime)	,,	£4 5s. to £4 10s.
Honey	lb.	3d. to $3\frac{1}{4}$d.
Maize	bush.	3s. 7d.
Oats	,,	2s. to 2s. 8d.
Onions	ton	£8 10s.
Pollard	,,	£5 10s.
Potatoes	,,	£6 10s. to £8 10s.
Potatoes, Sweet	cwt.	1s. 9d. to 2s.
Pumpkins	ton	£2 15s. to £3 5s.
Wheat, Milling	bush.	3s. 6d. to 3s. 7d.
Eggs	doz.	$8\frac{1}{2}$d. to 10d.
Fowls	pair	3s. 6d. to 4s. 6d.
Geese	,,	6s. to 6s. 6d.
Ducks, English	,,	3s. 6d. to 4s. 3d.
Ducks, Muscovy	,,	4s. to 5s.
Turkeys (Hens)	,,	8s. to 10s.
Turkeys (Gobblers)	,,	16s. 6d. to 20s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	14s. to 16s. 6d.
Bananas (Fiji), G.M., per bunch	3s. to 8s.
Bananas (Queensland) per case	...
Bananas (Queensland) per bunch	...
Bananas (Fiji) per case	...
Bananas (Fiji) per bunch	...
Mandarins (Queensland), per case	8s. to 10s.
Oranges (Queensland), per case	9s. to 10s. 6d.
Oranges (Queensland) Navel, per case	...
Passion Fruit, per half-case	3s. to 10s.
Pineapples (common, Ripleys, and Queens), per case	6s. to 8s.
Strawberries (Queensland) per 3-quart tray	1s. 6d. to 6s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples, Eating (American), per case	8s. to 12s.
Apples, Cooking (American), per case	7s. to 9s.
Bananas (Cavendish), per dozen	2½d. to 4½d.
Bananas (Sugar), per dozen	3d. to 4d.
Cape Gooseberries, per quarter-case	6s. to 7s.
Citrons, per cwt.	...
Cocoanuts, per sack	13s. 6d.
Custard Apples, per case	...
Lemons (Local), per case	6s. to 8s.
Limes, per case	5s. to 7s.
Mandarins, per case	7s. to 10s.
Oranges (Navel), per case	6s. to 7s. 6d.
Oranges (other), per case	5s. to 7s.
Papaw Apples, per quarter-case	1s. to 3s. 6d.
Passion Fruit, per case	5s. to 7s.
Peanuts, per lb.	...
Pineapples (Ripley), per dozen	2s. to 3s.
Pineapples (Rough), per dozen	6d. to 2s. 6d.
Pineapples (Smooth), per dozen	2s. to 3s. 6d.
Strawberries, per dozen pints	3s. 6d. to 12s.
Tomatoes, per quarter-case	4s. to 6s. 6d.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1913.

Animal.	AUGUST. Prices.
Bullocks	£11 12s. 6d. to £13 17s. 6d.
Cows	£7 12s. 6d. to £9 2s. 6d.
Merino Wethers	23s. 6d.
Crossbred Wethers	30s.
Comeback Wethers	30s.
Merino Ewes	18s. 9d.
Crossbred Ewes	23s.
Border Leicester Ewes	30s.
Lambs	17s. 9d.
Pigs (Light Porkers)	...

EXHIBITION PRICES.

Animal.	AUGUST. Prices.
Champion Bullock	£23 10s.
Champion Cow	£18
Guessing Bullock	£24
Bullocks	£17
Cows	£13 5s.
Merino Wethers	27s.
Crossbred Wethers	36s.
Merino Ewes	22s. 6d.
Crossbred Ewes	25s. 6d.
Lambs	22s.

Fenwick and Company, Salesmen, Brisbane, report, under date 23rd September:—

Sundries (15-9-13).—Horse hair was again in poor demand, and values generally ruled 1d. per lb. lower. Best lines of cow hair were firm, but other grades ruled lower. Shanks, hoofs, glue pieces, &c., were in strong demand at the best of late rates; while horns were practically unchanged.

Marsupial Skins (22-9-13).—Catalogues were not nearly so large as last sale, 102,000 skins being offered. As was only to be expected, the quality showed signs of going off, and this had a bad effect on values. Scrub wallabies, small and medium, declined from 4s. to 6s. per dozen, while large skins were practically unchanged. Rock wallabies were in quiet demand, seconds realising about last sale's rates, but first ruled lower. Swamp wallabies also ruled lower, but padda-melons were practically unchanged. Kangaroos were decidedly easier, and values were from 4s. to 6s. per dozen lower. Wallaroos, whiptails, and goatskins realised slightly lower values. We sold 20,985.

Hides (23-9-13).—Average supplies were submitted to-day to a full attendance of buyers. Sales opened to good competition at last week's rates, and continued brisk throughout, closing with light hides fully ⅛d. per lb. dearer. We sold 2,037.

Calfskins and Yearlings (23-9-13).—Both descriptions were in good demand, and realised late rates. We sold 2,361.

Sheepskins (19-9-13).—Competition ruled exceptionally keen on short wools, and values for all lengths up to half wools were the highest we have seen for some time. Full wools, although at times irregular, generally realised late rates. We sold 3,313.

Tallow (19-9-13).—Although prime tallow realised from £30 to £30 5s. per ton, the demand was not nearly so brisk, and the market had a distinctly weaker tone. All tallows under prime quality are very hard to dispose of, and the margin between them and prime is very marked. We sold 56 tierces.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5 35	5·25	5·49	4·56	6·8	4·46	6·31
6	5.58	5·35	5·24	5·49	4·55	6 9	4·46	6·32
7	5·57	5 36	5·22	5·50	4 54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	5·53	5·38	5 19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6 39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6·21	4·50	6·42
23	5·38	5·43	5·6	5.59	4·47	6·22	4 51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4 46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6·26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
1 Sept.	●	New Moon	6 38 a.m.
7 ,,	☾	First Quarter	11 6 p.m.
15 ,,	○	Full Moon	10 46 ,,
23 ,,	☽	Last Quarter	10 30 ,,
30 ,,	●	New Moon	2 57 ,,
7 Oct.	☾	First Quarter	11 46 a.m.
15 ,,	○	Full Moon	4 7 p.m.
23 ,,	☽	Last Quarter	8 53 a.m.
30 ,,	●	New Moon	12 29 ,,
6 Nov.	☾	First Quarter	4 34 a.m.
14 ,,	○	Full Moon	9 11 ,,
21 ,,	☽	Last Quarter	5 56 p.m.
28 ,,	●	New Moon	11 41 a.m.
6 Dec.	☾	First Quarter	12 59 a.m.
14 ,,	○	Full Moon	1 0 ,,
21 ,,	☽	Last Quarter	2 16 ,,
28 ,,	●	New Moon	12 59 ,,

Farm and Garden Notes for November.

Field.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

Kitchen Garden.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the town with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

Flower Garden.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple Mussel, Circular Black, and Glover Scales. Fruit-fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am

certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit-fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit-fly in the early ripening fruits, and gather and destroy all that may be so affected.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXXI. NOVEMBER, 1913. Part 5.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Records of Cows for Month of September, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Loch ...	Ayrshire	31 Aug., 1913	1,071	4·6	55·42	
Auntie ...	,, ...	15 July ,,	821	4·4	39·65	
Bluebelle ...	Jersey	13 July ,,	634	4·8	33·30	
Honeycombe	Shorthorn... ...	7 June ,,	611	4·6	31·61	
Bee	Jersey	7 July ,,	519	4·6	26·85	
Nellie II. ...	Shorthorn... ...	5 June ,,	703	3·4	26·46	
Miss Edition	Jersey	19 July ,,	563	4·0	25·16	
Burton's Lady	Shorthorn ...	23 June ,,	585	3·8	25·06	
Sweet Meadows	Jersey	20 Aug. ,,	336	6·2	23·58	
Lennie ...	Ayrshire	1 Sept. ,,	656	3·2	23·14	
Cocoatina ...	Jersey	19 May ,,	441	4·6	22·82	
Gretchen ...	Holstein	19 June ,,	587	3·4	22·09	
Gem ...	Shorthorn... ...	8 Aug. ,,	560	3·4	21·07	
Countess of Brunswick	,, ...	22 July ,,	583	3·2	20·56	

The Horse.

PARASITIC MANGE IN HORSES.

DEFINITION.

Parasitic mange is the name given to a condition of the skin caused by parasites, known as mites or acari, which belong to the family Acaridæ. It is a contagious disease, since the parasites may be conveyed to other equine animals.

THE PARASITES.

The mange mites are exceedingly small, round or oval in shape, and usually only visible through a hand lens or microscope. There are several distinct stages in their development; the newly hatched mites (larvæ) have three pairs of legs, but after further development they acquire a fourth pair. The legs are furnished with bristles, claws, and some with suckers. From the head project the feeding organs, and the jaws resemble saws. The body is furnished with scales, spines, and bristles. The adult females lay eggs, which hatch out into larvæ in from four to seven days. These larvæ, after successive moultings, develop into adults. The mites can exist on moist dung for several weeks, but live for a shorter time on a dry surface. The eggs are said to retain their vitality for several weeks if moisture is present, but in a dry atmosphere only for from three to six days. The mites are killed in a short period if exposed to a temperature of 104 deg F. or over, but moderate warmth, such as obtains in warm stables and during summer, stimulates them and renders them more active.

FORMS OF MANGE.

Three varieties of parasitic mange affect horses, asses, and mules, viz:—(1) Sarcoptic, (2) Psoroptic, (3) Symbiotic. Each is caused by a special mite which has a somewhat different mode of life.

The *Sarcoptic* forms spreads slowly, but is the most serious on account of its being the most difficult to cure. The mites, known as the *Sarcoptes,* bore their way through the outer skin, burrow underneath it, and cause irritation to the animal, setting up inflammation of the skin. In the small galleries or tunnels thus formed the mites lay their eggs. It is on account of this burrowing habit that it is difficult to reach the parasites with destructive agents. The mites may attack any part of the body, but they usually locate themselves first about those parts which come in contact with the saddle or other harness, from which they may spread to other parts. The Sarcoptic form of mange is analogous to the itch or scabies of man.

The *Psoroptic* form generally spreads more rapidly over the body. It is more prevalent than the Sarcoptic form. At first it is

usually confined to those parts situated near the long hair of the body, such as the neck, withers, rump, and base of tail, but in advanced or neglected cases the parasites may spread all over the body, and may be found on the buttocks and inside the thighs. The mites, which are known as *Psoroptes,* live on the outer surface of the skin, and cling to it by means of their mouths and limbs. They bite the skin to obtain food, causing irritation and inflammation. Over the injured parts scabs are formed and scurf accummulates, amongst which the mites shelter, feed, and breed. The scab increases in size as the mites increase in number, and each new generation of young parasites selects fresh feeding ground, usually round the edge of the older scab, or the mites may, through the grooming, be disturbed and distributed, setting up additional centres of disease on other parts of the skin.

The *Symbiotic* form is probably the most prevalent, but it is not so serious as the two former. It is usually confined to the extremities of the legs, but may also affect the tail. It develops slowly, and only exceptionally invades other parts of the body.

An animal may harbour more than one form of mange at the same time.

SYMPTOMS.

Mange may not always be detected until it has made considerable progress, or the early symptoms may not have been regarded as important by the owner or the attendants.

The first indications are that the animal is restless, appears to be itchy, is incessantly rubbing against any object within reach, including the pole or shafts of the cart, or against other horses. Affected animals will even bite and gnaw the parts attacked by the parasites, scratch the parts with the hind limbs if accessible, and stand rubbing one leg against the other. They may be seen or heard scraping, pawing, kicking, or stamping the feet a good deal, especially during the night in a warm stable. There may also be switching and rubbing of the tail. When the scabby parts are touched with the hand or passed over with the grooming tools, the animal will lean towards the attendant and manifest a sense of pleasure, which is frequently accompanied by a nibbling movement of the lips. The hair over the affected parts bristles or stands erect, and in more advanced cases is twisted or broken off short. Bare patches of skin are seen, due to the hair falling out or having been pulled or rubbed out. The skin may show an inflamed, pimply surface, with some long or broken hairs still in place, or the part may be quite bare and scurfy. The parasites cause pimples to appear on the skin wherever they bite. Yellowish lymph exudes from the pimples, and helps to form small scabs. This lymph may mat the scabs and hairs together into a hard mass, which may be partly or entirely rubbed off, leaving an excoriated surface. On the hairless parts red scabby spots may be seen, which readily bleed, and there may be patches of scab containing blood adhering to the skin. In advanced, neglected, and bad cases, the skin

loses its elasticity, becomes dry and hard, and is wrinkled or corrugated into folds. Finally, the scabby skin may crack, forming deep fissures. These may bleed and leave nasty, unhealthy-looking sores, which in turn may fester or suppurate. There is also an offensively smelling discharge in many cases. If the disease is allowed to proceed unchecked the animal speedily loses condition and becomes emaciated, gets no rest from the incessant irritation, has a very dejected and repulsive appearance, becomes weaker and weaker, and may even die in a state of exhaustion.

In the Symbiotic form of mange a horse may do serious injury to its limbs, particularly to the coronet, by bruising it with the opposite foot in making attempts to relieve the itchiness.

METHODS OF SPREAD.

Parasitic Mange can only be produced by one or other of the previously mentioned bites breeding and multiplying on the animal's skin. A single fertilised egg-bearing female is sufficient to start a case of mange, which in turn may spread to many other animals. All cases of mange can be traced to contagion from an existing or pre-existing case. The parasites can be spread directly from one animal to another, or indirectly through the medium of litter, rugs, bandages, grooming tools, saddles, harness, mangers, stable stalls, loose boxes, stablemen and their clothing and stable utensils. The parasites may be picked up by an animal at an hostelry, on board ship, at sales and fairs, in horse-boxes or railway trucks, at grass, by loan or exchange of harness or by the use of second-hand harness, and from shafts of carts. In fact, anything that has been in contact with a mangy animal, and which has not been subsequently disinfected, may be a vehicle of infection. Given infection, there are certain conditions which, in some animals, at least, appear to be more favourable to the development and spread of the disease; such are low condition and want of grooming. The parasites may live off the animal for some weeks in harness, clothing, litter, &c., and may therefore be capable of infecting another animal, or even re-infecting the same animal at a future date.

TREATMENT.

Mange is not primarily a disease, but a condition of the skin resulting from the presence and action of the parasites or mites, which obtain their nourishment by piercing the skin. The treatment must be directed to the destruction of the parasites and their eggs, and it is possible to use effective local remedies in the form of skin dressings, which will not only destroy the mites without causing further injury to the inflamed and irritated areas, but will act beneficially by allaying the irritation. The treatment is essentially an external one, but plenty of good food should be given, and, if the animal's condition has been reduced or the health materially impaired, tonic medicine given internally may be beneficial. Usually, however, recovery is effected without internal treatment.

PREVENTION.

All newly-purchased animals should be carefully examined for suspicious areas on the skin, and if such are present the animals should be isolated and kept under observation until expert advice can be obtained, but those in charge must not forget that mange caused by Sarcoptes or Psoroptes in equine animals is a notifiable disease. Care should be taken not to use second-hand or borrowed harness, clothing, grooming and stable utensils which have not been thoroughly cleansed and disinfected. Owners should be particular about the livery stables which their horses frequent, and litter which has been used for other animals should be regarded with suspicion.

In addition to the isolation and treatment of an animal actually affected with mange, particular attention must be paid to cleansing and disinfecting the stable, litter, harness, and all articles that have been used about the patient. The premises and articles to be included in the disinfection must be reckoned from a time prior to the recognition of the disease.—"Board of Agriculture and Fisheries' Leaflet 274."

HOW HORSES ARE SPOILED.

The "Live Stock Journal," in an article on this subject, says:—

There are a good many people who, either by reason of their bad or careless driving, succeed in spoiling a horse which came to them as free from vice or tricks as could be desired. A horse which by nature is not a shier can easily be transformed into something very like one by being unmercifully thrashed if he becomes startled at some unfamiliar sight. The next time he encounters anything of the kind he remembers his thrashing and associates the sight with suffering; then he shies again, and the punishment is repeated, with disastrous effects. The man who is careless about his harness, and who allows his horse to drive himself, will spoil any animal, and is as likely to end up by letting the horse down as not. But this observation must not be taken as suggesting that a driver should always be fidgeting and worrying his horse. His aim should be to get the animal to go right and to keep him at it; it is often the slovenly coachman who produces the ill-mannered horse. In frequent cases it is the driver's fault when a horse stumbles, but even when it is not so it is quite unnecessary to use the whip in nine cases out of ten. If the horse once begins to connect a stumble with a thrashing, he gets flurried when he puts a foot wrong, and is very likely to come down in consequence; but if he gets careless it is necessary to wake him up by a light stroke just to remind him that he must keep awake. Of course, the jagging at a horse's mouth is as certain a way to ruin the animal as anything can be; and it is very far removed from a good practice to shout at and rate a horse for no particular fault. A naturally timid animal is liable to lose its head on such occasions, whilst a bad-tempered one resents it, for horses are not fools, and are far more amenable to

kindness combined with firmness than they are to ill-usage or violence of any kind. This being the case, it is unfortunate that their memories should be so good, for the recollection of chastisement has often transformed an ordinarily-tempered horse into a perfect savage, and a good reliable worker into a useless brute. Of course, horses can be spoiled in many other ways, but it is believed that the causes mentioned above are responsible for most of the losses incurred by owners through the deterioration of their animals.

THE CRUELTY OF JERKING THE REINS.

In the issue of the "Queensland Agricultural Journal" for February, 1907, we wrote as follows on the cruel habit of jerking the reins:—

Pulling violently, and especially jerking the reins, is a too common practice with cabmen and drivers of horses, and, as they probably do it more out of ignorance than sheer brutality or spite, it is well they should know that the practice is a most harmful as well as painful one, both as regards the temper and the physical structure of the horse. A French expert, Baron Henry d'Anchald, has published the results of his observations on the painful effects of the practice of jerking the reins. "We are apt to forget," he writes, "that this mouth, which serves as the medium of communication between us and the animal, should never be subjected to rough treatment or shock if it is to remain sensitive and beautiful, as it undoubtedly is; that this mouth becomes bewildered and uncertain, so to speak, and hard under stupid or violent treatment, the jerking of the reins rendering the animal indocile, sullen, and stubborn."

The details of M. d'Anchald's experiments we have no space to go into here, but, to appreciate more nearly the intensity of the pain caused by the jerking of the reins, it need only be remembered that the cannon of the bit, which is more or less thick and round, rests upon but a very small part of a membrane, which is delicate, very nervous, and is itself the envelope of a tolerably trenchant bone. If one can imagine, therefore, the effect of a 33-lb. weight (so M. d'Anchald calculates the pressure) falling on one's toes from a height of, say, 15 to 20 inches, one realises to some extent the pain which is inflicted on an unfortunate horse by this always brutal jerking of the reins. Not only is jerking the reins useless in itself, but it is also most harmful, especially to young horses, as it compromises their future value and usefulness. In addition to that, the pain caused by it involves a loss of energy and fatigue, which soon uses up the animal. A flick of the whip applied to the hindquarters, or the withers, for example, should be all that is needed to stimulate the horse to fresh exertion.—"Garden and Field."

[This brutal practice is only too common in this State, and it is regrettable to note that female drivers of drays and spring carts are the chief offenders, although they would not use a whip because they think it cruel. Rein-jerking is far more cruel, and should be included in the cruelty to animals law.—Ed. "Q.A.J."]

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1913.

Five thousand three hundred eggs were laid during the month, making a total for the six months of 25,203—an average of 630·1 per pen, as against 541·4 for the corresponding period last year. The leading pen has laid 794 eggs, as against 721 last year. This improvement is largely due to the birds getting a much better start than in former years. J. R. Wilson wins the monthly prize with 147 eggs. The following are the individual records:—

Competitors.	Breed.	Sept.	Total.
J. R. Wilson	White Leghorns ...	147	794
A. H. Padman, S.A.	Do.	142	775
O.K. Poultry Yards	Do.	133	758
T. Fanning	Do. (No. 2)	130	753
Loloma Poultry Yards, N.S.W. ...	Do.	143	733
Range Poultry Farm	Do.	142	717
Moritz Bros., S.A.	Do.	142	713
T. D. England	Do.	128	714
F. McCauley	Do.	121	710
S. E. Sharpe	Do.	122	706
E. A. Smith	Do. (No. 2)	136	676
J. F. Coates	Do.	126	673
J. Zahl	Do.	121	669
R. Burns	Black Orpingtons (No. 2)	140	668
H. Tappenden	White Leghorns ...	122	665
Cowan Bros., N.S.W.	Do.	127	656
Jas. McKay	Do.	137	653
R. Burns	Black Orpingtons (No. 1)	144	648
A. T. Coomber	White Leghorns ...	142	634
Mrs. Sprengel, N.S.W.	Do.	131	628
Doyle Bros., N.S.W.	Do.	132	628
Mrs. J. R. D. Munro	Do.	127	622
R. Jobling, N.S.W.	Do.	120	616
E. A. Smith	Do. (No. 1)	146	603
W. D. Bradburne, N.S.W.	Do.	141	603
H. Hammill, N.S.W.	Do.	133	601
J. Gosley	Do.	114	601
D. Grant	Do.	129	594
Yangarella Poultry Farm	Do.	125	593
A. F. Caimkin, N.S.W.	Do.	121	581
A. Schbrowski	Brown Leghorns ...	129	564
J. Archibald, N.S.W.	White Leghorns ...	140	540
T. Fanning	Do. (No. 1)	127	538
T. Stephens, N.S.W.	Do.	135	537
C. Leach, N.S.W....	Do.	131	534
J. Murchie	Brown Leghorns ...	141	527
Mrs. Craig	White Leghorns ...	129	527
J. Anderson, Victoria	Red Sussex	123	516
Mrs. Bieber	Brown Leghorns ...	140	474
A. J. Collis, N.S.W.	White Leghorns ...	141	460
Totals	...	5,300	25,203

THE ART OF CAPONING.

BEING AN ATTEMPT TO DESCRIBE HOW THE OPERATION SHOULD BE PERFORMED.

The following excellent description of the operation of caponing from the "Illustrated Poultry Record," London, was published in the issue of this journal for December, 1910:—

It is strange, considering the simplicity of the operation, how few poultry-keepers practise the art of caponing young male birds, and still more strange since it is possible under certain conditions to make the work very profitable. It is not so many years ago since the number of experts who followed this branch of table-poultry could be counted on the fingers of one hand; now, fortunately, there are a large number of poultry-keepers who are able to perform the operation, but still the market demand at Christmas is considerably in advance of the supply, and there is opportunity for many others to work in this direction. Briefly stated, the advantages of caponing are as follow:—(1) Capons mature more rapidly, and grow to a larger size than would cockerels; (2) the flesh of an 8 or 9 months old capon is as tender and juicy as that of a spring chicken; (3) capons can be run indiscriminately with males or females during the growing period; and (4) the value per lb. of capon flesh is higher than that of ordinary cockerel flesh.

It must be understood that we do not advocate this branch of table-poultry production for all poultry-keepers, for under certain circumstances it would undoubtedly pay better to dispose of the birds when 3 to 4 months old at the then market price. The conditions under which capons can be raised successfully are those which are usually found in what is termed farm poultry-keeping—where poultry form only one part of the stock maintained, or where there is ample room for them to have their liberty. The reason for this is that as the birds have to be fed for some 5 months after they reach a killing age, if all foods have to be purchased the profit is largely eaten up by the food bill; but if the conditions are such that the capons can be turned out on to the stubble after harvest, then on to plough land or on to pasture, they will gather for themselves practically all that is required to keep them growing steadily until it is time to fatten them for market. This branch can also be worked profitably when market gardening is run in conjunction with poultry-keeping, for in this case a large amount of the feeding stuff can be composed of the unsaleable vegetable produce.

We have stated that this is an attempt to describe the operation of caponing. We have put it this way, for we realise how difficult it is, even with photographs, to teach the art by a written description, but we believe that if our instructions are carefully carried out in detail anyone will be able to perform the work successfully if they (1) do not object to the sight of a little blood; (2) are not made sick by the peculiar smell arising from the organs of the body; and (3) are not nervous or likely to get flurried. The last-mentioned is very important, for if the work is hurried in any way fatal results are likely to accrue, but by this we do not mean the operator is to dawdle. Remember, there is a great difference between working rapidly and hurrying. Provided the follow-

ing instructions have been mastered, not longer than 10 minutes should be taken with the first bird, from the time the first cut is made to the last stitch. As showing how simple the operation really is, we may state that an expert can handle 18 or 20 birds in an hour.

As the object of caponing is to make large birds, only those which belong either to the table or the general purpose class should be used. Cockerels from 10 to 12 weeks old are best for the purpose. As the abdominal portion of the body has to be opened, it is advisable to starve the birds for 24 hours, so that the intestines may be practically empty. The appliances necessary, besides the instruments, &c., shown in Fig. 1,

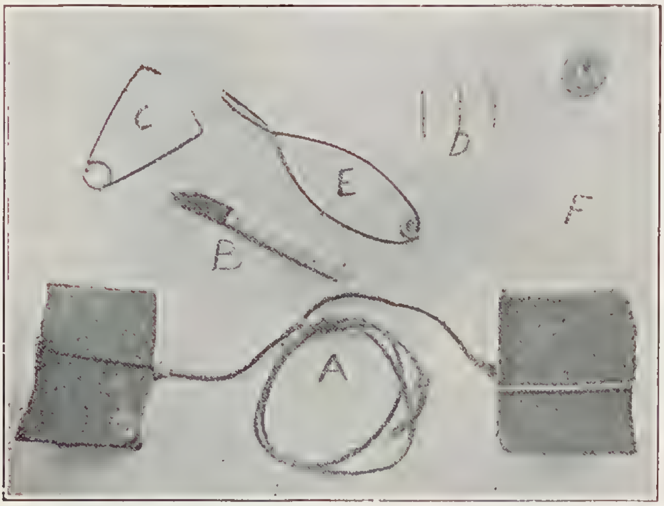


Fig. 1.—(A) Half-bricks with cords attached for holding bird in position.
(B) Knife.
(C) Spreaders for opening wound during the operation.
(D) Sponges made of cotton wool twisted round the ends of matches.
(E) Forceps for taking hold of the testicles.
(F) Surgical needle and silk for stitching wounds.

are a table about 2 ft. 6in. wide, a bowl of very cold water in which a few grains of permanganate of potash have been dissolved, and a couple of clean dusters. The remainder of the tools required are described below the photograph. The cockerel is taken, and the noosed end of the cord attached to one half brick is passed over the wings and tightened at the shoulders; the other is fastened round the legs above the hocks. The bricks are then dropped over the sides, the left side of the bird resting on the table, as seen in Fig. 2. The area which has to be plucked as in Fig 3. is douched in cold water, and the feathers are pulled out. The effect of the cold water is to deaden the sensitiveness of the skin, and thus the bird hardly feels any pain. One of the dusters is now taken, soaked in cold water, and folded so that it forms a strip some 2 in. wide, and this is placed over the feathers in front of the plucked area, as shown in Fig. 3.

The most difficult part of the operation is to locate the exact position for cutting. Great care must be exercised in finding it. To describe it, we must touch on the question of the anatomy of the fowl. There are seven ribs on either side, springing from the backbone. The first two of these, counting from the front of the bird, are loose ribs—that

is, they are only attached to the back. The remaining five spring from the backbone, take a backward direction at first, then turn at an angle of about 120 degrees, go forward and join the sternum. It is only with the two last ribs on either side—those nearest the thigh—we have to deal, and in the case of, say, an Orpington at 12 weeks old, the section attached to the backbone is about 1¾ in. long. The cut has to be made between the two last ribs from the backbone to the point where they

Fig. 2.—Showing bird in position with weights attached.

turn to go forwards. The membrane which separates the thoracic from the abdominal section of the body is attached to the sixth rib, and therefore if the cut is made between the fifth and sixth ribs the lungs will be touched, and it will be next to impossible to take out the testicles. Cutting into the thoracic portion of the body, and even cutting the lung, does not often cause death, but as a second cut will be necessary on the same side great care should be taken to find the exact position at first.

Pass the first finger of the left hand, commencing at the thigh, towards the front of the bird until the seventh rib is reached, pass over this, pressing the nail between it and the sixth rib just about midway between the backbone and the angle of the ribs. Holding the finger firmly in position, the point of the knife—with the cutting edge towards the breastbone—is inserted to a depth of ½ in., and a cut made to the angle of the ribs. With the finger still in position, the knife is taken

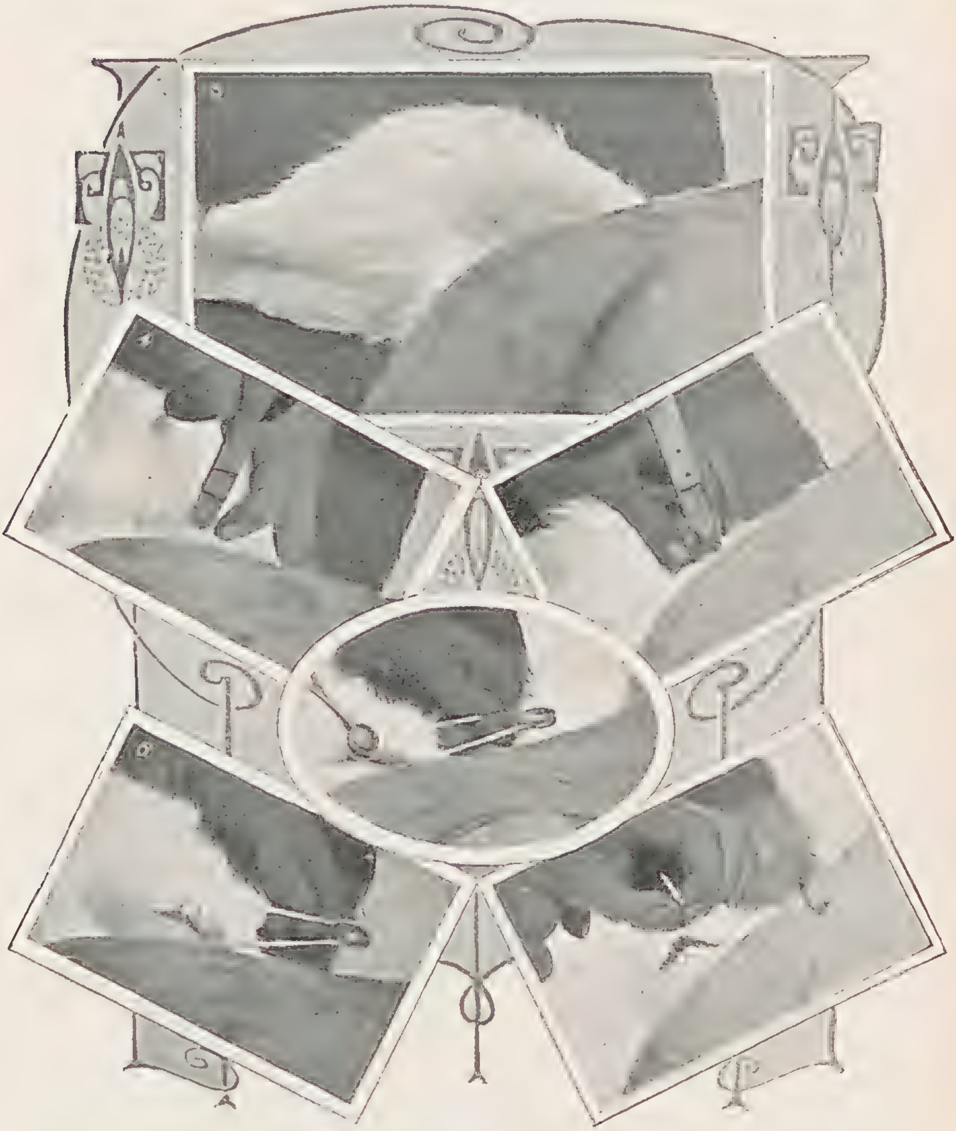


Fig. 3.—Operation area cleared from feathers.

Fig. 4.—The first cut. The fingers must be held in position between the sixth and seventh ribs during this part of the work.

Fig. 5.—The fingers still between the ribs, but the knife is here turned and ready for continuing the cut to the backbone. Note the knife must be held in a vertical position.

Fig. 6.—The spreaders holding the wound open so that the internal organs may be seen.

Fig. 7.—By means of the forceps the testicle is severed from the fastenings which connect it with the backbone and withdrawn.

Fig. 8.—As explained in the text, it is advisable for novices to put one stitch into the wound. The needle is passed through the skin on each side of the incision, and these are drawn together and tied.

out, turned round with the cutting edge to the back, reinserted, and, removing the finger, the incision is continued with the knife vertically until the backbone is reached. The reason for holding the finger between the ribs during both cutting operations is that, the skin being loose, it may move and the cut be made in the wrong place. Figs. 4 and 5 show this part of the work.

The spreaders are next inserted, the seventh and sixth ribs being held in the two hooks of that instrument, as in Fig. 6. Surrounding the organs in the abdominal portion of the body is a fine membrane. It may happen, and we generally succeed in doing it, that this membrane has been already severed by the first cutting; if not, the knife must be again used, but with caution, for it lies very close to the intestines. If there is sufficient blood in the body to make the organs indistinct, this should be soaked up by means of the sponges. In all probability, if the bird has been well starved, the right testicle will be in view. It is a small bean-shaped organ, yellow in colour, and is attached to the backbone. If not, by means of the forceps, the intestines should be pushed gently towards the breastbone, and this will bring it into view. Taking the forceps in the right hand, they should be inserted, slightly opened, with the ring blade towards the testicle, and a firm grip taken of that organ. With a half-turn the connection is severed, and the forceps with the testicle withdrawn, as shown by Fig. 7.

We have suggested that the cut in the first place should be made as large as the length of the ribs allow, and we believe it best for novices to do this, but it is advisable, after a few birds have been done, to make as small an incision as possible. With a large wound it is wise to put in one stich to draw the skin together, and for this either a surgical or an ordinary needle, slightly curved, and white silk should be used. Only the skin must be sewn, for if the flesh covering the ribs be taken up the slightest movement of the fowl will tear it apart. Fig. 8. When sufficient practice enables the operator to work with a small opening, it is better not to stitch the skin at all. A gas is given off from the inside of the body, and if the wound heals too rapidly the bird will become puffed up, and to allow for the escape of the gas the skin will have to be pierced.

To take out the second testicle, the operation is repeated in a similar way on the other side of the body. As soon as the operation is over, the bird should be placed in a small coop littered out with clean straw. For a couple of days a small amount of food should be given five times a day. It is unwise to allow the bird to fill its digestive organs until the wound is partially healed. The best food we have found is soaked biscuit-meal, dried off with toppings or ground oats, with about 10 per cent. meat-meal added. After two days the bird can be given its liberty, but it is better if it is not allowed to perch for a few days longer. The birds recover very rapidly from this operation, and the death-rate is low. A proficient operator will not lose more than 2 per cent., and frequently a whole season will pass without any mortality at all. About five weeks before the Christmas demand commences the fowls should be picked up and fattened.

The Orchard.

DESIGN OR "LAY-OUT" OF A COMMERCIAL APPLE ORCHARD.

Being on a visit to a fruit-growing district in North Queensland some time ago, we found a very fine orange orchard in which the trees were planted on the "Square System," and in subsequent conversation with the owner we suggested the possibility of increasing the number of trees per acre by the adoption of a system of triangles; and, working it out on paper, we found that by some such system several more trees could be planted than by planting them in rows, or by reducing the space allowed to each tree by adopting the "Quincunx" System.

The following highly instructive paper on "Design or 'Lay-out' of a Commercial Apple Orchard," by R. Gordon Edgell, of Bathurst, in "The Farmer" for 6th August, 1913 (Perth, Western Australia), we publish in the interests of many intending fruit-growers in this State, as the system described will apply to citrus fruits as well as to apples:—

IMPORTANCE OF SYSTEMATIC LAY-OUT.

By R. GORDON, EDGELL, Bradwardine, Bathurst.

Having decided upon the class of fruit he intends to grow, and after obtaining his land, the orchardist is confronted with the problem of making the best use of it. The choice of design or "lay-out" is one of the most important factors in solving that problem. It cannot be too strongly insisted that this is by no means a matter for individual taste or fancy.

Upon it very largely depends the economical use of the land by the trees and the economical cultivation and working of the orchard. It is fundamental, and is the one factor which, once adopted, can never be altered. If we plant wrong varieties, we can later on work them over to better kinds; if our methods of pruning or cultivation are faulty, we may mend our ways afterwards; but once the trees are established in place we must, for good or ill, adhere to the system adopted. This may mean far more than the difference between profit and loss.

Much of what follows is applicable to all or many of the various systems of lay-out, and each grower should carefully consider the subject from his own point of view and conditions before he plants. It is proposed to describe in outline the methods adopted by the writer in the design of commercial apple orchards of 10 acres or larger areas. The arrangement of the trees in various patterns throughout the orchards is almost as old as the hills, but as far as the writer is aware some of the methods he describes are novel.

Analysis of the Principal Systems.

A commercial orchardist will aim at obtaining the highest average returns from the lowest average expenditure. Rather than produce a

few fancy specimens, he will desire to raise the all-round excellence of his crops. In order to do this, each root and branch of each tree should be encouraged to bring forth its best. Where one branch or twig is seen to crowd or interfere with its neighbour, the pruner will unhesitatingly cut it back; but the same man will be found to so arrange his orchard trees that some of their roots are almost sure to crowd out some of the other roots, and, because this takes place underground and out of sight, it does not trouble the orchardist's mind, though his pocket has to suffer.

As the young tree grows to maturity, its roots will radiate in all directions, and the ground it feeds and lives upon will approximate to the figure of a circle, with the stem of the tree at its centre. It is not claimed that every root of every tree is equal, so that each occupies a perfect circle of the same size; but this is the average, especially where the orchard growth is healthy and where the trees are pruned and cultivated with a view to equality and symmetry. As the average tree will naturally occupy a circle of land, the planter should so arrange that each tree is provided with its circle of the requisite area, and that there shall be as little as possible of "waste" land in between the circles. The author does not claim that all the land between the circles is absolutely wasted; he realises that some fortunate root may push out into a "waste" corner, and so make full use of it; but the average root will not do this, and it is absurd for the planter to provide fantastic shapes of land for his trees to grow into just because by lucky chance some of them may be filled. In all examinations of systematic planting the natural requirements of the tree should be borne in mind, even though special conditions may be paramount.

Before deciding on the spacing of the trees, local and all other conditions should always be well studied, but these hardly fall within the scope of the present article. For the sake of illustration it will be advantageous to assume some definite width of spacing, and the distance of 24 ft. (which is suitable for most Bathurst conditions) has been adopted in this article.

On the assumption that our estimate of the tree's natural growth is correct, each tree at maturity will utilise a circle of ground 24 ft. in diameter. If we provide less, the roots of adjacent trees will crowd each other; if more, some of the land will be wasted, and there will be fewer trees to earn the planter's income, while the cost of working the "waste" land will have to be met year after year.

Clearly, then, the design which allows of the arrangement of the greatest number of circles of adequate area per acre will (other considerations being equal) be the most profitable.

Types of Lay-out.

Only the five following systems of lay-out are considered here:—

No. 1—"The Square System."
No. 2—"Alternating Squares."
No. 3—"The Quincunx."
No. 4—"The Row System."
No. 5—"Equilateral Triangles," or "The Hexagonal System."

The Square Lay-out consists in planting the trees at the intersections of equi-distant straight lines crossing each other at right angles. In other words, each of four adjacent trees will stand at one of the four corners of a square.

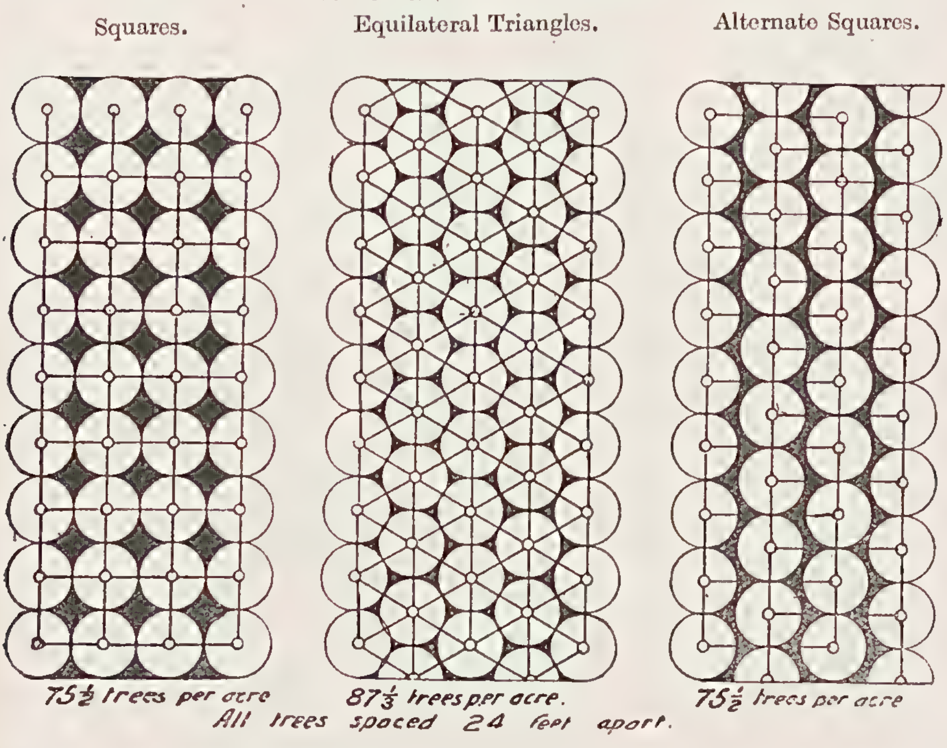
"Alternating Squares."—This system is a modification of No. 1, inasmuch as the trees in one row are not planted opposite those of the adjacent rows, but midway between them. This really results in planting in a series of triangles, but the triangles are not well proportioned.

The Quincunx is like No. 1, except that a centre tree is planted in the middle of each square. It is recommended only where the main orchard trees are likely to grow to great size and require very wide spacing. Under these conditions the centre space may profitably be filled by quick-maturing varieties (such as peaches) which will have paid for themselves before the main trees demand their removal.

But planters should not fall into the error of thinking that, because there is only one filler in the centre of four standards, the proportion is only 1 to 4. The number of fillers and of standards is equal, and the real spacing is halved with many of the disadvantages of close planting. Only under exceptional circumstances is Quincunx planting advisable.

The Row System consists in planting the trees in rows as grape vines are usually set, and for many reasons is only recommended where the trees are to be trellised like grape vines or are to act as wind-break.

1.—ORCHARD LAY-OUT.



The Triangular System disposes of the trees in equilateral triangles, and they also fall into truly straight lines, as in other systems. The method is recommended as being theoretically the most correct, both as

regards equal disposition over the land with least waste, and also for economical and convenient working and cultivation of the orchard. It should always be chosen unless some very strong local conditions forbid.

Comparison of Systems.

The only two systems of lay-out which need comparison here are "The Square," because it is so well known, and "The Triangular," because of its many merits.

Having decided that his trees will require a spacing of 24 ft. apart, the planter will find that if he sets them in squares only 75½ can be planted per acre, but, if in equilateral triangles, he gets nearly 12 more trees, or 15½ per cent. more per acre. This is illustrated by Diagram No. 1, which also shows a block of trees planted on the system of "Alternating Squares." In this diagram the "waste" land is shown in black, and inspection will prove that there is very much more "waste" with the lay-out in squares and alternating squares than in equilateral triangles. It is the saving of this waste which gives the triangular lay-out so many more trees in the same area of orchard.

When planted on the "square," each tree is allotted a square of land 576 square feet in area, although it should only naturally fill a circle of 452½ square feet. It requires little more than three-quarters of the space we have given it.

If, however, we dispose of our trees on the "triangular" lay-out, each receives a block of land in the form of a regular hexagon, which so closely approximates to the form of a circle that there is very little "waste," and what there is can be filled by the tree's roots with very little crowding.

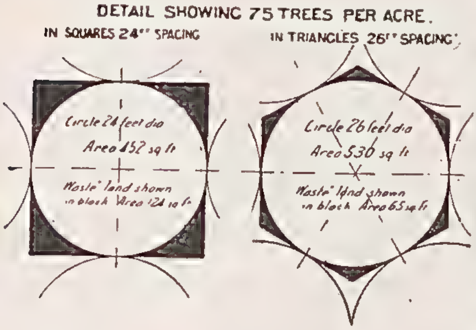
Nature appears to have taught the bee something of the advantage of the hexagon over the square. The honey cells of the bee's comb are always hexagonal and not square in form.

Instead of planting our trees 24 ft. apart, we may decide to set a given number to the acre of orchard land. Suppose we decide to plant about 75 trees per acre (see Diagram No. 2), then, if set "square," the spacing will be as before; but if we adopt the "triangle" we can give each tree an extra distance of almost exactly 2 ft. greater spacing; it will live on a circle of 26 ft. diameter or 530½ square feet area, instead of one of 24 ft. diameter and only 452½ square feet.

The writer does not claim that an acre of land can be increased in area if triangles are drawn over it, nor reduced if marked out in squares. But if the trees are planted in triangles their roots will be more evenly distributed than if set in squares, and the whole of the land can be made use of by the former method with very much less poking about of the roots into odd corners than if the latter lay-out had been chosen.

And many of the advantages which the trees derive from the triangular design are also felt by the men and teams which have to work the orchard. The triangles are formed by the intersections of three sets of straight lines, so that there are three main lines of roadway. But if

the square method had been adopted, these main "lanes" would be reduced to sets of two instead of three. True, they are slightly narrower where the planting is triangular, but in driving through the orchard no two trees are passed at the same time; that on the right-hand will have been left behind before the vehicle comes abreast of the tree on the left, so that the man can watch both and damage neither. But probably traffic is more greatly facilitated by the ease of turning in the triangular orchard than by any other element of its design. An inspection of Diagram 2 will show how closely the hexagon fits round a circle; the path of a turning vehicle or plough is approximately circular, so that it is easily kept within the hexagonal space provided. When turning from one lane to another in the square orchard, the turn must be through an angle of 90 degrees; but in the triangular orchard this angle is only one of 60 degrees. The latter orchard, with its 87 trees per acre, appears to escape from damage at least as well as those planted with only 75 trees on the "square."



When comparing the various systems of lay-out, it is only the sets of main lanes or widest passages between the trees in each design which should be considered; it is to these that the traffic will eventually be confined, although the beautifully radiating but narrower lanes which are found in each system may be made use of while the trees are small.

In the square lay-out there are only two sets of main lanes crossing each other at right angles, but if the triangular design has been adopted the number of these wide passages will have been increased by 50 per cent., so that the orchard traffic can almost always find a convenient short cut in the direction it wishes to take, and this alone saves much knocking about of the trees, because there is less turning, and what there is is through an easier angle.

Apple orchards are usually established on undulating sites. It is very important that the furrows of cultivation shall be taken in nearly level contours rather than up and down the slopes. If the furrows are nearly level it will be found that storm water will be encouraged to soak in and promote the welfare of the trees; but if the plough has been taken up and down the slopes, each open furrow will form a miniature creek, and the best of the plant food and surface soil will be scoured away, whereas the same furrow, if level, instead of steeply sloping, will form a trap to hold the water and catch the particles of plant food with which it is charged. Now, all ordinary hills and the ends of ridges approximate to the circular form. Diagram No. 2 shows how very much better the lines of triangular planting fit round a circle (and consequently round a circular hill or point of ridge) than do the lines laid out on the square system. In practice the ploughman finds it easy to follow almost level lines, and when a change in the slope of the ground is reached he has

only to turn through an easy angle of 60 degrees in order to follow it; but if the orchard had been planted on the square the angle of turn would be much more severe, and the new direction of furrow would not be level, but so sloping as to encourage scour.

At those seasons of the year when thunderstorms are expected, "up-and-down" ploughing is dangerous, but at other times cross cultivation can be followed with advantage. Either the square or the triangular lay-out permits of this work being done, but the balance is in favour of the triangle, because of the greatly reduced amount of expensive hand work in keeping the orchard free of weeds.

From every point of view, both in practice as in theory, the triangular design is superior to the square; it is better for the trees and better for the men who work them, while its appearance is so pleasing that it has only to be seen to be appreciated. The writer recommends that it be adopted in all but very exceptional cases.

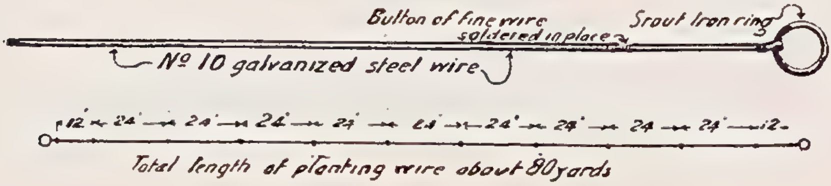
The Planting Wire.

No matter what the type of design may be, many measurements must be made in order that it be correctly laid down on the orchard ground. For this work there is nothing so handy as a planting-wire, and the small cost of making one will be more than repaid, even if only a very few acres have to be planted. It is made of No. 10 galvanised steel fencing wire, with an iron ring at each end and soldered "buttons" to mark the graduations. These buttons are easily made by twisting a few coils of fine wire round the main wire wherever a graduation mark is required, and soldering it in exact position. Before any graduation is attempted, the plain wire should be very tightly stretched over even ground, so that the measurements along it can be easily and accurately made. It will be found convenient to make the little coils which form the buttons, and slip them on to the main wire before its end rings are fastened on.

The length of the planting wire should be as great as can be conveniently used over the uneven orchard land which is to be planted. The longer within reasonable limits the wire is made, the less will be the work of setting out the positions of the trees, and the greater the accuracy attained. The length of wire found most useful in laying out large orchards whose land is fairly even has been about 120 yards, but for general purposes 80 yards will be found sufficient. If the land is very uneven the length may with advantage be still further reduced, but it should be kept as long as possible.

The details of the planting wire will be made clear by an examination of Diagram No. 3, which shows a wire graduated for planting the

3.—THE PLANTING WIRE.



trees with a spacing of 24 ft. About 2 or 3 ft. from the ring-end the first button is soldered; then comes a distance of exactly 12 ft (half the distance of the selected width of spacing) to the next button; and then regular spaces of 24 ft. each, until the other end of the wire is approached, when the distance to the last button is 12 ft. and a short length to the last end-ring.

The Use of the Planting Wire, and Method of Setting-out the Orchard by Means of Base Lines.

Instead of pegging out on the ground the position of each tree, it is recommended that the orchard be marked out from end to end with a system of base lines. These should be parallel to each other, and spaced at such a distance apart that the two end buttons of the planting wire shall just reach from base line to base line when the wire is tightly stretched across between them at the angle required by the system of lay-out adopted. This angle will be one of 60 degrees if the planting is to be in equilateral triangles, and it will be a right angle if the square system has been chosen. In either case the planting wire and the base lines will be of equal value in accurately locating the positions of the trees. Each button on the planting wire (except the two end buttons, which are kept on the base lines) will mark the position for a tree, and if desired a peg may be driven there; but the author believes that the use of a peg to mark the tree's position is both confusing to the men and very wasteful of their time. The much better way is to plant the tree just beside the button of the wire while the wire is still in position marking its exact place. If a planter once tries this method, he will never bother with pegs and planting-boards again. There is no difficulty in digging the hole for the tree while the planting wire is in place; the button shows the exact position even after the soil has been removed in digging the hole, and it also indicates the original level of the ground, so that the man planting will know how deep to set the tree's roots, and be quite sure that when the hole is filled in the young tree will be found to be at the proper level.

After all the trees along the planting wire have been set—that is to say, after a tree is planted just beside each button—then the wire is lifted at each end and carried up to the next set of marks on the two base lines, where it is staked down and tightly stretched, and another cross row of trees is planted as before.

The Base Lines.

The whole accuracy of the work depends on accurate setting-out of the base lines. If the orchard were in the form of a long narrow strip of land—say only 100 yards wide—then a base line should be carefully laid down parallel to one of the long fences; and near it a second base line, parallel to the first, is then laid down at the other side of the orchard, and, as the planting wire is stretched from each pair of pegs on the two base lines, the whole orchard will have been covered, and all the planting completed.

But usually the orchard is too wide to permit of a planting wire of convenient length being stretched from side to side, and in this case three or more base lines will be required, and the orchard land will be covered by planting in successive long blocks, as wide as the planting wire will span.

Setting-out the Base Lines.

Unless special precautions are taken to prevent it, some inaccuracy is likely to be found in measurements taken over uneven ground. The simplest way for an untrained person to reduce these inaccuracies to within negligible limits is to begin his measurements near the centre of his orchard. The lengths of the measured lines are thus reduced, and the amount of error is also decreased; besides this, there is good chance of such errors as may creep in tending to counterbalance each other and so disappear.

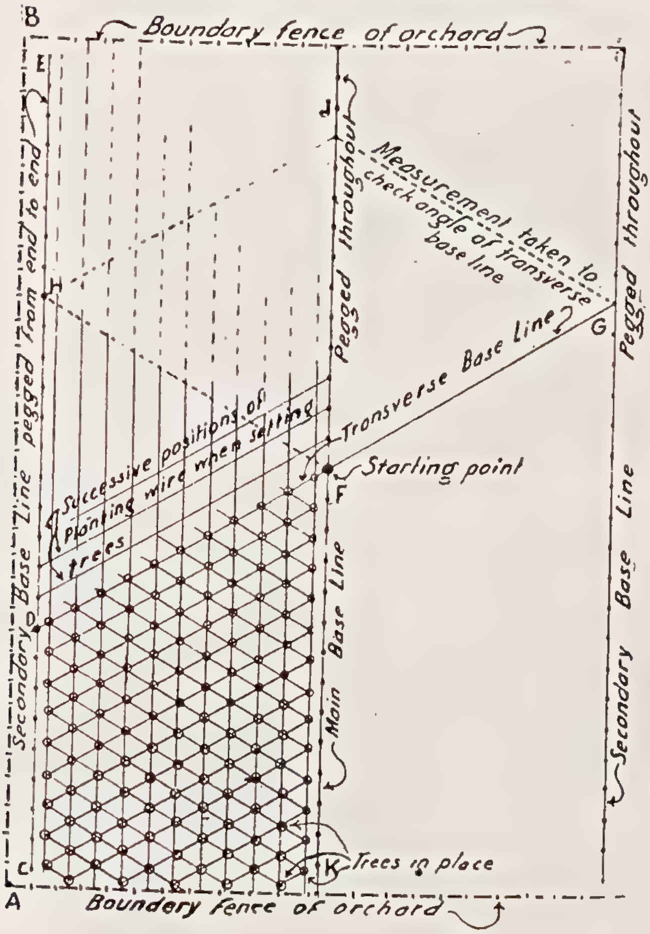
After having decided on the direction in which his lines of trees shall run, the planter will proceed to set out his base line in accordance therewith. Presuming that the planting is to be done in equilateral triangles, the method adopted by the writer is as follows (see Diagram No. 4):—Let AB represent the fence of the longest side of the orchard, and let it be understood that the longitudinal lines of trees are to be parallel with this fence, then the planter will stake out a line CDE, which must be quite straight and parallel with the fence. It will be used as a base line, and should be located at such a distance from the fence that the nearest trees (which will be distant from it 12ft. along the planting wire) shall have the desired amount of clearance.

A stake should now be set up approximately at the point F, nearly in the centre of the orchard. The transverse base line DFG will have to be marked out at an angle of 60 degrees with the line CDE, and its approximate direction is best found as follows:—Take a piece of binder twine or other cord about 50 yards long, tie the two ends together, and pass a large wire nail through the knot, so that it shall be firmly fixed; two other wire nails are then knotted into the twine so that there shall be exactly the same distance between all three. Now select a point D exactly in the line CDE, and drive one nail there; pull the cord tight between that nail and the next to it, and drive it in exactly on the line; now take the third nail and, pulling the cord tight between it and each of its two mates, mark the exact spot. This should give an equilateral triangle, and mark the proper direction for the transverse base line DFG. But it is probable that two or three trials will be required before the line is found to pass within, say, a few yards of F; when it does so, the point D can be finally fixed, although F is still to be definitely located. The exact position of F is found by stretching the planting wire from D in the direction of F, and then measuring its full length to H (exactly on line CDE). The distances between D—H, D—F, and H—F should be made exactly equal; we shall then know that the position F is correct, and the transverse base line can be produced to the far side of the orchard. The distances F—G, F—J, H—J, and G—J should all be measured and found exactly equal to F—D. The line JFK can now be staked out perfectly straight, and, beginning at the point F, it

must be marked out from end to end in spaces of exactly 24 ft.; this is done with the same planting wire that has been used for all other measurements. The base line CDE will be pegged, as will all other base lines, into 24-ft. spaces, the measurements being started where the transverse base line crosses the others.

In staking out a straight line, a plummet with a fine hard string should be used. If it is held steadily at arm's length and the sight taken along the string, it will be found that the work is very much more accurate than if an attempt is made to sight more or less crooked sticks into line without a plummet. The pegging of the longitudinal base lines is done with pine pegs about as thick as a man's thumb and 9 in. long; they should stand up 3 in.

4.—METHOD OF LAY-OUT BY MEANS OF BASE LINES.



Sometimes the whole of the land is ploughed and subsoiled before any marking out of the lines is done, but the writer prefers to mark out the orchard first, and, after properly fixing the base lines, the approximate positions of the long lines of trees can be easily staked, so that a strip of land, say, 12 ft. wide, may be ploughed and subsoiled for each line of trees. The base lines, of course, must not be ploughed out until the planting is done; but the remainder of the orchard can be

ploughed, and for that matter subsoiled at once, though it appears better practice and cheaper to only subsoil strips about 12 ft. wide during the first year and to subsoil the remainder during the next year or two, so that the soil shall be freshly loosened up as the roots extend towards it. The unploughed land between the strips is of great advantage while the work of planting is in progress; men and horses can walk on them instead of plodding through the ploughed land. Of course, the entire surface will be ploughed as soon as the planting is finished, even though some strips of subsoiling may be left for another year.

After having carefully established the main base line nearly down the centre of the orchard, the measurements with the planting wire when the trees are being set should always be taken from this base. The man in charge of the planting should take the end of the wire which is worked along the main base line, while another man will pull it taut to the next base line. The first will then stake down his end, so that the button near the ring shall be just even with the peg in the base line; then the man at the other end will firmly stake his end of the wire in place, so that it passes just beside the proper peg in the second base line. All the trees can now be planted along the wire, which will be moved up to the next two pegs in the base lines, and another row of trees planted as soon as the wire is set. Sometimes the button at one end of the wire will not quite tally with the peg in the secondary base line. There may be a difference of an inch or so; this is due to uneven ground over which the wire is stretched, and may be neglected if the other end is kept strictly to its place on the main base line.

Although this method of planting is somewhat difficult to describe, it is really simple in practice; once the base lines are properly set, there should be no trouble and no delay. Quite inexperienced men will be found to properly set 100 trees per day per man, digging all holes and doing all the work, except the fixing of the base lines, which is done, perhaps, weeks before. The lines of trees will be found so perfect that, even if the trouble had been much greater, the result would have fully justified it. Men planting should always work in pairs; both will dig the hole together, throwing the surface soil on one side and the subsoil on the other; then, a cone of surface soil having been formed in the bottom of the hole, one man takes the tree and plants it, while his mate supplies him with soil sprinkled freely from the shovel until the roots are well covered. The planter then stamps the soil well round the tree, keeping it upright, and just touching the button of the planting wire, while the hole is completely filled by his mate. The two then go to the next tree.

When setting the last few trees in the corners of the orchard it will be found that the planting wire will have over-shot the end of one base line, and that the positions of the remaining trees cannot be fixed as before. However, the trees which are set will line up so beautifully that the lines and positions of the few trees still to be planted are clearly shown; they can be easily measured, or even sighted in, with considerable accuracy.

HURRYING NATURE.

A NEW METHOD BY WHICH TREES THAT FRUITED IN EIGHT YEARS ARE MADE TO BEAR IN TWO.

By WILLIAM ATHERTON DU PUY.

A method of hurrying trees to their period of fruitation has been discovered at the Government hot-houses at Washington. There the men who juggle with living plants, and make them do things of which Nature never dreamed, have recently succeeded in diverting the vigour of trees that were large and strong, sending their sap coursing through the veins of spindling seedlings and thereby caused those seedlings to do in two years what ordinarily would have taken eight.

Take, for example, the finger lime of Australia. This is an exceedingly rare plant. Three years ago it had not a representative in America. About that time somebody sent three seeds of the finger lime to the Department of Agriculture. These were planted immediately, and all grew. Seeing the seedlings were of the Lemon family, the scientific growers knew that it would require eight years for the finger lime to come into bearing under normal conditions. Eight years is a long time to wait in an experiment.

At just this period the new method of diverting the vigour of other trees into a seedling was in the course of being established. The process is known as "inarching." One of the finger lime seedlings was inarched upon a vigorous two-year-old lemon tree. All the strength of that tree was diverted into the slender shoot. In two years it had ripened its fruit, and the scientists were able to judge of its quality. Further, they were supplied with additional seed with which to start new generations of plants.

This shortening of the fruiting time of plants is of inestimable value to the scientific developer of fruits. The breeding of fruits is one of the most fascinating of the modern sciences, and the results that are just now being obtained read like romances of conjurers. The greatest stumbling block in the way of working out of these modern miracles has been the length of time required in producing successive generations of a given plant. It has often happened that a scientist has died before he has accomplished the end for which he has set out. But now the time is to be cut to one-fourth, and the probabilities are that results will be, in the coming generation, multiplied a hundred fold.

The inarch is accomplished in this way:—The seedling is grown to the age of but three or four weeks. It is a weak little plant of but four or six leaves. Nature has stipulated that many years must pass before it comes to maturity, blossoms, and bears fruit. Under the inarch process this stripling is taken up with a ball of earth about its roots snufficient to maintain its life for a few weeks. The whole is transferred to a stalwart vigorous tree of a kindred species. This tree may be two or three years old. Its roots are deep. It is supplying sustenance for a top that is a hundred times as large as the seedling.

This is known as the nurse tree. The outer bark is scraped from the side of the nurse tree 1 ft. above the ground. The outer bark is

likewise scraped from the seedling. The two wounds are bound together with soft cloth bands. The ball of dirt on the root of the seedling is bound to the side of the nurse tree. In two or three weeks the plants have grown together. The dirt from the roots of the seedling may be removed. It is now drawing its vigour from the nurse tree. Eventually its roots are cut off smoothly below the point of union. The nurse tree has taken the little orphan plant unto herself.

But this is not the end. After the union is thoroughly established, the plant juggler cuts the top off the great vigorous nurse tree. Then is all the nourishment that was going into its top diverted to the single small stem. Then do its roots which have been establishing themselves deep in the soil for years send their vigour into the small seedling. The result is such growth as Nature never knew. The twig has such an abundance of nourishment that it vents some of it in fruiting before its time. And this early fruit is strong and vigorous, showing the utmost possibilities of the tree.

There are scores of experiments which the Department of Agriculture has had underway for many years, that have been worked through the slow cycle of generations of plants, but may now be hurried by means of the new method. There is the citrange, for instance. The citrange is a hybrid fruit. It was obtained through that scientific development in fruit breeding that has been going on for the last decade, and which has as its basis the cross-fertilisation of kindred fruits.

The orange, the grape fruit, the lemon, the tangerine, even that ornamental plant known as the mock orange or Japanese orange, all belong to the same family. Their relation is so close that they may be crossbred. Plants may be crossbred by shaking the pollen from the flower of one into that of the other. The process in Nature is brought that they can grow only in communities not visited by frost. So the scientist, wishing to cross certain varieties, prevents the fertilisation of the flowers by the bees by putting paper bags over the given blossoms. Then, when the time is ripe for experiment, he removes the bag, shakes the pollen from the flowers of the one plant into those of the other and puts back the paper bags. The seeds that result from the fruit from these flowers will be a cross between the two plants used in the experiment. They may be planted and the hybrid fruit grown. This is just what has been done between the ordinary orange and the mock orange. The mock orange is a cold-resistant plant. It will grow as far north as New York. The great difficulty with the oranges and citrus fruits is that they can grow only in communities not visited by frost. So the scientists have sought to cross the cold-resistant branch of the Orange family with the branch that produces the best fruit, and thus secure a plant that will produce a good fruit and will also grow in a cold climate.

Now a hybrid seed so obtained requires, under the methods of unaided Nature, the accustomed eight years to bear fruit. A wait of that length of time is necessary before the experimenter knows whether success or failure has crowned his efforts. Then, possibly, he finds that 1 plant in 100 has yielded something that is promising. In such crosses there is a great divergence of type. It is only by selecting certain

individuals in which the types desired exist, and seeking to accentuate these types, that a given fruit may be built up and established. Likewise, it requires many generations to get the desired characteristics fixed in a given plant. Under the old system the time so consumed was such that seven years were required in establishing a new fruit. In the citrange two plant generations have been grown under the old system. The fruit that has been developed will grow anywhere in the Southern States. It takes on the nature of an improved lemon. It will be more nearly a substitute for a lemon than any other of the fruits that we now have. It is still an ornamental tree, and the Department of Agriculture recommends that people living in the Southern States plant the citrange in their yards as ornamental plants and derive the added advantage of being able to pick ripe fruit for citrangade, or for any of the purposes for which lemons are used, from their own gardens at almost any time of the year. There are 10,000 people now growing the citrange trees.

But had the inarch and the nurse tree been in use the citrange would have been passed through eight generations instead of two by this time. The fruit would have been much more highly developed. Manyfold greater results would have been already accomplished.

But, with the citrange developed as at present and the inarch discovered, there seems great opportunity in this fruit in the near future. The citrange is but typical of a great number of new fruits that are just now being developed. There is the tangelo, which is a cross between the tangerine and the pomelo or grape fruit. The grape fruit is overbitter for many people, and its skin is close fitting; making the meat hard to get at. The tangerine is over sweet, and the kid-glove skin almost falls from it. It is easy to imagine the fruit that would result from this cross. By selection and combinations of the desired qualities by crossbreeding the specimens, the scientists believe that they will be able to establish fruit that will have just the right amount of tartness and just the desired kind of skin. Already there are some specimens of the tangelo growing in Florida that are said to be in every way superior to the orange. With the use of the nurse plant and the inarch, great things are expected in the next few years.

There is another application of the inarch that is just now being tested. Delicate fruits, such as the lemon, that refuse to grow except in a few spots in the very warmest parts of the United States, are being inarched upon such cold-resistant plants as the mock orange. It is known that it is the sap control of plants that protects them from frost. The lemon, for instance, keeps its leaves full of sap throughout the winter. When the weather gets sufficiently cold this sap is turned into ice, and the plant is as a consequence killed. But where the lemon is inarched on the mock orange, which by Nature has a sap control adapted to cold climates, the story is different. When cold weather approaches, the mock orange roots refuse to send the sap into the top of the tree. It, therefore, fails to freeze and is not killed by the cold. So it is hoped that by inarching the orange, the grape fruit, the lemon, or any other of the citrus fruits upon the sturdier related growths farther north, the danger line may be crowded into materially higher latitudes, and that

even the citrus fruits of the present day may be grown in a vastly wider range in the United States.

The inarch may also be extensively used in rose culture. When scientific plant growers develop a hybrid rose through this same method of cross fertilisation, they have been forced to wait for years until it came into flower. Some of the most delicate blossoms grow on stalks that are also delicate and slow to develop. Such seedlings may be inarched on the stalk of some sturdy and well-rooted rosebush and vigorously crowded into blossom. Its virtues or lack of them may be sooner determined.

There are those who say that practically the same thing may be accomplished by the old process of budding or grafting. This is however, not the case. Before a plant may be budded onto another stalk it must have acquired considerable age in order to produce the right sort of buds. The process of budding is most delicate, and the results are in question. It is vastly slower than the inarch. It is vastly more difficult. The Government plant growers state that any intelligent man, though entirely inexperienced, can readily accomplish the inarch, while the baffling process of budding requires the most exact scientific skill.

The man who has been the moving spirit in the inarch work of the Government is George W. Oliver, who has charge of the Government hot-houses at Washington. Mr. Oliver, like so many of the great gardeners and agriculturists of the nation, is a Scotchman. The greater part of his life has, however, been spent in the United States, and for many years his has been the ceaseless care that has kept the temperatures right in the Government hot-houses for growing plants that range from the Arctic Circle to the Equator. This transfusion of the energy of one plant to another is his final success, but is merely typical of the manner in which he works the things of the vegetable kingdom and succeeds where there would seem hope for nothing short of witchery.—" Scientific American."

The above appears to be what is known in Ceylon as the " Gootee Method of Propagation," of which we wrote in the " Queensland Agricultural Journal " of August, 1908, as follows:—

THE " GOOTEE " METHOD OF PROPAGATION.

Mr. H. F. Macmillan, in the " Ceylon Tropical Agriculturist," on this subject, writes:—

" The gootee mode of propagating plants has been practised in India from early times. It is adopted in the case of trees which are difficult to raise by layering, or which seldom set seed, and also as a means of increasing any tree of special merit, or part of a tree (as a sport) exhibiting a variation which it is desirable to perpetuate. When other methods of propagation fail, the gootee is resorted to, and, if carefully carried out, it is usually successful. It is of special value in propagating fruit trees, for not only are the plants thus obtained true to kind, but they also come into bearing much earlier than plants raised from seed. The same is true of flowering trees, shrubs, climbers, &c., and for such as

do not, from some cause or another, produce seed, propagation by gootee is the best means of multiplying them.

"To proceed with the gootee, select a firm healthy branch, with well-ripened wood, immediately under a leaf-bud or node; take off a small ring of bark, about 1 inch wide. To this apply a ball of clayey soil, holding it securely together with coir fibre, tow, or moss, and bandaging all firmly round the branch. A little above this hang a pot or chatty; through the hole in the bottom of the latter draw from within a piece of rope; a knot tied on the end of the rope should fit tightly against the hole of the vessel above. The rope, thus secured by its

PLATE 137.—THE "GOOTEE" METHOD OF PROPOGATION.

knotted end within the pot, is carried on at full stretch and coiled round the gootee. By this means the water, with which the pot is kept supplied, oozes slowly out, trickles down the rope and along the coil, and so distributes itself over the whole gootee. In from three to four months young roots should be seen protruding through the gootee, when the branch may be cut from the parent tree, and planted where it is intended for it to remain. The operation should be carried out in the wet weather, commencing when active growth in the tree begins."

[A similar method of propagation has long been carried out in Queensland, but the operation is well worth drawing attention to.—Ed. "Q.A.J."]

REPORT ON THE ORANGE GROVES IN THE MARYBOROUGH DISTRICT.

By C. ROSS, Instructor in Fruit Culture.

The primary purpose of my visit to the Maryborough district was to investigate the diseases more particularly affecting the orange groves, as requested by the general secretary of the Queensland Farmers' Union and the secretary of the Queensland Fruit Growers' Industrial Trading Society.

At Melrose the oldest groves were planted thirty years ago on land originally covered with large forest trees and fairly dense undergrowth, constituting a sort of bastard scrub. The geological formation is that called Lower Burrum of the Trias-Jura system.

The soil is a free working, fairly porous, reddish, sandy loam. Overlaying a weak, yellowish subsoil, with a suspicion of clay, it is close in texture and indicative of a certain amount of retentiveness that during continuous wet weather would be likely to cause acidity, also excessive dryness during long dry spells. If this subsoil was brought into a similar mechanical condition to that of the surface soil, by the aid of explosives, subsoiling, draining, &c., any deleterious elements, if such are present, would be eliminated; and there seems to be no reason why a properly managed orangery on such a site and soil should not continue in its fullest prime for a very much longer period.

When the trees were planted, the only preparation of the land was that of grubbing out the undergrowth and ringbarking the tall timber, the dead skeletons of which are standing to-day. Young orange-trees were planted in lines amongst these trees at distances far too close for the best results to obtain. As they grew, the foliage of each tree came in such close contact with that of its neighbour that sunlight has been almost powerless to exercise its beneficial influences on the soil.

The orange-trees, however, did very well and bore heavy crops of excellent fruit up to a few years ago. Some of the growers told me that the first signs of unhealthiness had been first noticed soon after the big drought (1902), since when they have gradually declined until at the present time a very woeful aspect appears. With the exception of Mr. H. G. Habler's section, the majority of the trees are dead or dying and past recovery.

The theories advanced by different growers as to the origin of the troubles are many and varied, some of which are as follows, viz.:—Excessive spraying, infestation by insect and fungoid pests, old age, exhaustion of soil, excessive use of organic manures, want of drainage, acidity in subsoil, deleterious gases arising from same, drought, &c. Whilst agreeing that some of the conditions are contributory causes, others are only results of improper application and lack of good culture. The primary cause, which in the main is undoubtedly "root rot," is probably caused by Armillaria fungus, which I saw growing in several places in the orchards.

Several trees were uprooted, and it was found that the extremities and under-surface of the roots began to decay first, being quite different to collar rot, which starts decay at the base of the stems. The Assistant Entomologist, to whom I sent specimens of the roots for investigation, bears this out, but also mentions that there is another form of root rot that originates in the subsoil. Wither-tip, die-back, mussel scale, and white louse were also prevalent. These diseases and pests are usually concurrent with the primary cause.

The prevention of and remedies for such root troubles as exist in the Melrose orchards consist of such operations as will thoroughly aerate and sweeten the land. First by deep working, grubbing out all dead roots, followed by continuous surface working from the time the trees are planted. By providing a good soil mulch, a deeper root system would be induced and surface roots discouraged. The repeated injury to surface roots by cultivation is a frequent cause of some form of root rot. When surface roots occur in old orchards it would be better to trench a narrow strip midway between the rows and clean the ground by chipping. Close planting should be avoided; a distance of 25 ft. is little enough between trees of dwarf varieties, and 30 ft. for more robust growers. Dense overhead shade encourages surface roots and discourages the deeper ones, and the land can never be properly cultivated. Occasional dressings of lime in the form of limestone screenings would also be beneficial for correcting acidity and destroying Armillaria fungus.

On the 30th of July and following days I visited the orangeries on the Burrum River and in the neighbourhood of Howard. In the majority of cases I found a decided improvement in the conditions of the orchards since my last visit. There are, however, places where disease is rampant, but which generally takes quite a different form to that affecting Melrose. I did not notice the "root rot" fungus, but "collar rot" or mal de goma is of such a serious nature that it has completely decimated the greater part of certain orchards, and hundreds of trees are affected to the extent that they are quite beyond recovery.

When this disease is first noticed it may be counteracted by the following method, always in addition to the cultural treatment recommended for "root rot":—After seeing to the drainage, completely cut out the discoloured or diseased bark and wood, and apply a dressing of coal tar to the wound.

The characteristic symptoms of "collar rot" are—(1) Gumming at the collar; the decay of the bark at the same place, with a disagreeable odour; the exudation of gum tears is a sure indication of disease. (2) Unhealthy appearance of the foliage. (3) Death of small shoots; the fruit setting abnormally thick and the foliage turning yellow are also indications.

Collar rot is one of the most destructive and widely spread citrus diseases, and was first noticed in this State in 1876.

The following is a summary of a few observations on this question made by Mr. McAlpine, late Government Vegetable Pathologist of Victoria:—

Conditions Favouring Disease.—Unsuitable soil is said by some to produce the disease, because it aways occurs towards the base of the stem, near to or beneath the surface of the soil; but transplanting the trees to similar soil may lead to their recovery.

Sudden changes in the temperature of the soil surrounding the stem are also supposed to induce it. The want of proper drainage is likewise a contributing condition.

Close and deep planting, producing an excess of shade and a deficiency of feeding roots; excessive irrigation, keeping the soil soaked with water; excessive cultivation, which may tend to injure and disturb the roots; and the continuous use of organic fertilisers are all said to encourage the disease.

It is supposed that the use of lemon stocks renders the trees specially liable to this disease, but Mr. Tryon found that affected trees at Toowoomba worked on orange stocks were equally liable to "foot rot."

I quite agree with Mr. Tryon's finding regarding stocks. The rough lemon stock is exceedingly popular in the Yeppoon district, where the rainfall is heavy; and I have seen some of the finest and healthiest trees in the State in the Central districts, on the Burrum and elsewhere, worked on lemons, and have not noticed more liability to collar rot than those worked on orange stocks. I prefer orange stocks for rich scrub lands; but on forest lands, plains, and flats I have found the rough lemon stock more hardy, robust, and quite as immune from disease as the orange.

DYNAMITE IN PLANTING.

Further evidence of the value of explosives in tree planting is furnished by the following notes taken from the "Times of Ceylon" and republished in "Grenier's Rubber News." We hope the day is not far distant when the use of dynamite will not be, as at present in Queensland, confined to the operation of one or two up-to-date farmers:—

We have from time to time drawn the attention of the planting community to the advantages in many ways of the use of dynamite as an aid to planting, and we cull the following facts from the report of a demonstration which appeared in the "Times of Ceylon":—

In a rubber section about 1¼ acres there were put down 100 holes of an average depth of 21 in. each in twenty minutes' time, with three coolies at the work. The charge used was half a plug of dynamite No. 1 for each hole, which worked out at 10 cents a hole, or Rs. 10 per acre. The time occupied in putting down the holes, making and preparing the charges, charging the holes, and the firing, until the last charge went off, was two hours. The ground, which was an unplanted section of the rubber plantation, was a fairly hard gravelly loam. A tree stump, about 2 ft. in diameter, was blown off by using four cartridges, which cost 50

cents Ceylon money. Several rocks were also blasted and one large boulder of about 25 tons at a cost of 75 cents without any drilling. The boulders were completely shattered, and the spectators were surprised at the result. An important matter was also the destruction of ant-hills. Some enormous ones were completely shattered. One termite hill 6 ft. high and wide in proportion was destroyed at a cost of about 25 cents. The explosion, besides shattering the ant-hill, also killed the greater part of the insect inhabitants.

An estimate of cost of blasting with dynamite was worked out which is interesting for purposes of reference. A case of dynamite cartridges, weighing 25 lb. and containing 200 cartridges $\frac{7}{8}$ in. in diameter, would cost about Rs. 24, equivalent to 2 cents per cartridge. Detonators cost Rs. 19·50 per 1,000, practically 2 cents each, and the fuse costs about 1 cent per foot. For general work, half a cartridge costs 6 cents; detonator, 2 cents; and 2 ft. of fuse, 2 cents; making a total of 10 cents per hole. To this has to be added the cost of coolie labour, which works out at 1 cent. per hole; so that the total cost of a hole is 11 cents. Of course, the advantages in labour saving and ensuring the best growth and better yields through planting in dynamited ground are considerable—advantages which are now well known.

PINEAPPLE CULTIVATION.

The pineapple will thrive on comparatively poor soil, but must be well manured every year. Careful preparation of the land and deep stirring prior to planting will be found to pay well. The plants soon take root, and once established are very hardy. When heavy frosts are expected, some hay thrown over the plants is sufficient protection. They are propagated by means of suckers coming from the base of fruit-bearing plants, or from smaller suckers called "robbers" or "gill sprouts" that start from the fruiting stem just at the base of the fruit. Crowns of the fruit may be used as plants, but this is not recommended, as the plants are often two or three years before bearing, and then only one fruit for a first crop. Gill sprouts are the best to plant, as they always develop a good root system before fruiting, and the first crop is always better than from root suckers. Once a pineapple plant has borne a fruit, the fruiting stalk dies and its place is taken by one or more suckers which, in their turn, fruit and die. To form a plantation, set the suckers out in single or double rows 8 to 9 ft. apart, and the plants from 1 to 2 ft. apart in the row. The rows soon increase in width by the growth of suckers and the throwing up of ratoons (surface roots which send up plants from below as distinct from suckers. It is not at all uncommon to see the rows grown together, so that the plantation seems to be a solid mass of plants, and pathways have to be kept between the rows to permit of gathering the fruit and manuring. Once the pine is planted, the cultivation is simple. If in single or double rows, all weed growth is kept down between the plants, and the ground between the rows (the 9-ft. spaces) kept in a state of good cultivation, the soil being worked towards the rows to encourage the formation of suckers

low down on the fruiting plants. The manure is worked in on either side of the rows. The pineapple plants will give a first crop in from twelve to twenty months, according to the type of suckers planted. Every sucker will produce a fruit. One thousand Queen pines in a plantation in full bearing is by no means an unusual crop in Queensland; and, averaging them at 2½ lb. each, you get a return of 30,000 lb., or 15 tons per acre. Smooth-leaved pines run to as much as 14 to 16 lb. each, but the average weight is from 6 lb. to 8 lb. each.

The rough-leaved Common Queen and Ripley Queen are very prolific, and generally average 4 lb. per pine, some attaining 6 lb.

Plants cost from £1 10s. to £4 per 1,000, according to variety; 4,500 plants are required per acre; planting after preparing the land costs about 10s. per acre.

When planting suckers, remove the dead short leaves at the base so as to give the young roots a chance to start.

A NEW METHOD OF FERTILISING THE SOIL.

A new method of applying chemical fertiliser to fruit trees is proposed by M. Cadoret, and he finds that it gives much better results in experiments which he has been making in France. The usual method is to simply spread or strew the chemical fertiliser on the ground at a certain distance around the trunk of the tree, but it is found that this has a disadvantage in that the fertilising principles do not penetrate into the ground as rapidly as might be supposed, so that their action is felt but slowly. M. Cadoret finds that a much better plan is to use an iron rod having an expanded part near the point so as to make rather large holes in the ground. Such holes are filled with the fertiliser, which consists of a properly prepared mixture, using some precautions. The fertiliser, in order to prevent damage to the roots from the caustic action, should be mixed with crumbled earth beforehand. From four to six holes should be used, deep enough so as to contain all the fertiliser required for the tree in question, and the holes are best placed about 12 in. from the trunk. The depth of the holes is increased to keep pace with the growth of the tree. According to M. Cadoret, the above method gives remarkable results, and he finds that peach, apricot, cherry, and other trees of five years' growth are as well developed as other trees of twelve years. The method has the advantage that it does not imply extra cost. Two men can treat eighty trees a day in this way.—"Rubber World."

KEEPING APPLES.

Mr. E. Ross, Instructor in Fruit Culture, writes:—

"The accompanying illustration is of a fair sample of apples taken from a case that had been stored in an ordinary packing-shed at Stanthorpe for five months, shown at the National Association's last Exhibition in August for one week, recased, and kept in an ordinary living-room in Brisbane until the 1st of October. The skin, although

beginning to shrivel, showed no signs of decay, and the flesh was quite firm. The variety is named ' Oregon Mammoth Black Twig,' and grown by Mr. P. Ludlow, of Stanthorpe. Another variety I have had under my observation—viz., ' King of Thompkin's Country '—kept in splendid condition for nearly six months. This goes to prove that, if proper fruit-storing rooms were constructed, and such as the above and other long-keeping varieties were grown, ' cold storage ' would be unnecessary to enable the apple-growers of this State to successfully compete with the Southern product coming in at a later period, when the general crop of the Stanthorpe district has been marketed."

Plate 138.—Apples Stored in an Ordinary Packing-shed for Five Months.

Tropical Industries.

COMMERCIAL POSSIBILITIES OF SYNTHETIC RUBBER.

By LOTHIAR E. WEBER, Ph.D.

It is rather peculiar that, although the conversion of isoprene into a rubberlike substance has been known for upwards of twenty years, further progress in this direction has been practically stagnant until recent date. This is not altogether due to the lack of effort, but rather to the enormity of the problem. The synthesis of rubber, however, received a new impetus about three years ago, when two German chemists, Hofmann and Harries, working independently, succeeded in obtaining almost simultaneously products which gave the chemical reaction of rubber and had certain physical resemblances to the natural product. Since then considerable progress has been made in this direction and, more recently, stock companies have been formed and capital subscribed with a view to actually placing synthetic rubber on the market. The daily Press, both in this country and especially in Europe, gave the latest development of synthetic rubber wide publicity, sharing the optimism of the promoters and inventors of the new process; and as a result the general public, and, to a very large extent, rubber manufacturers themselves, have been led to believe that synthetic rubber can in the near future be manufactured in competition with the natural product.

I do not wish to give the impression of holding in light regard the magnificent work which has been accomplished by European chemists in their efforts to synthesise rubber. I almost think that a certain amount of chemical training is necessary to appreciate the innumerable difficulties and pitfalls which face the investigator in these fields. These men deserve the profoundest admiration for their painstaking and laborious efforts, but it is greatly to be deplored that the public was given to understand that synthetic rubber is to-day a commercial possibility, since, if the promise is not fulfilled, the attitude of the public will scarcely be one of admiration.

Synthetic rubber enthusiasts have been very fond of comparing the synthesis of rubber with that of indigo, asserting that the same fate awaits natural rubber that befell natural indigo. These two problems, however, have very little in common, and differ from each other in such striking respects that the two syntheses are not capable of comparison. I should like to take up this comparison in more detail, because I think in this way the difficulties which will prevent commercial synthetic rubber becoming a realisation during the next few decades can be more clearly shown. Before doing so, however, I would ask your indulgence in attempting to make clear to those of you who are not chemists the meaning of a rather formidable looking word which is always in evidence

whenever there is any mention of synthetic rubber. I refer to the word "polymerisation."

We are being continually informed that isoprene polymerises to rubber, and that the process of converting isoprene into rubber is one of polymerisation. The process of polymerisation, briefly stated, is one whereby a large number of small units combine to make a single large unit. It is essentially a process of agglomeration. This process of agglomeration takes place between the molecules, the latter, as you know, being regarded as the smallest amount of substance that is capable of existence. The molecules of isoprene, at least 100 of them, unite and polymerise into one single molecule of rubber. Unfortunately, we have not the least idea exactly how many isoprene molecules go to make one molecule of rubber, and it is possibly certain that the natural rubbers themselves vary very widely in respect of their degree of polymerisation. It does, however, seem probable that the higher their degree of polymerisation—that is to say, the more the number of isoprene molecules that unite to form one rubber molecule—the better are the physical properties of the rubber. In other words, two rubbers of exactly the same chemical composition, with different physical properties, owe this latter difference to their different degreees of polymerisation. It follows, then, that a uniform degree of polymerisation would be the first requirement for a synthetic rubber.

Unfortunately, the chemist of to-day is absolutely powerless in determining this degree of polymerisation experimentally, and, to a certain extent, of controlling it. For instance, it is not possible to go into a laboratory with a quantity of isoprene and polymerise the latter to any desired extent. In fact, we have no means of feeling sure that we can on two different occasions bring about the same degree of polymerisation. With the chemical methods available to-day, it would be absolutely impossible to make a product with an assured uniform degree of polymerisation, and, until this is possible, I fail to see how there can be any possibility of commercial synthetic rubber. The first requirement of such a product is uniformity of polymerisation, but as we have no means of determining this uniformity, or lack of it, variations would be bound to occur which would make the employment of such synthetic rubber by the manufacturer altogether too precarious. We all know to what disagreeable results variations in the uniformity of the natural product lead, and in the latter case the possibilities for uniformity are infinitely more favourable than in the case of the synthetic product.

Now let us briefly consider the case of indigo. Here the problem was to manufacture an article of absolutely definite characteristics and properties. It undoubtedly required a vast amount of chemical skill before the composition of indigo was determined, but, once this important feat having been accomplished, the chemist had a definite conception of the substance to be synthesised. Furthermore, there could never be the least doubt as to whether the investigator had actually succeeded or not in obtaining indigo. It is the work of only a few moments to be able to definitely decide whether a product is indigo or not.

In the case of rubber the state of affairs, as we have seen it, is totally different. In the first place, the methods of polymerisation are still in their infancy; we have no means of controlling its magnitude or of assuring its uniformity. The chemical methods of to-day are wholly insufficient for the solving of this problem.

Synthetic rubber enthusiasts have either overlooked or ignored with supreme indifference the very important fact that in the year 1916 the price of raw rubber must of necessity drop very considerably. It is estimated (and from all accounts the estimate is a conservative one) that by the year 1916 the Eastern plantations alone will be able to produce 100,000 tons per year, although there are two factors which have not been taken into account in making the estimate, which might have a very serious effect on the future of the plantations. These factors are—First, diseases of the tree; and, secondly, the labour problem.

The chance of the trees becoming infected either with a disease or insect pest is probably very small, as the bulk of the plantations are under very careful supervision, and special precautions are being taken to prevent such an occurrence. The labour question seems to be of more serious consequence, as the Malay coolie is of rather independent nature. Nevertheless, it is highly probable that the estimate is not exaggerated. Even to-day one repeatedly hears statements being made that the plantations that are producing rubber could, if necessary, put their product on the London market at 25 cents per lb. This is probably slightly exaggerated, but not very much so. One has only to look at the dividends now being paid by some of the Eastern plantations to realise that there is a certain amount of truth in this statement. As things stand to-day, supposing it were possible to market synthetic rubber at 50 cents per lb. in great quantities, the competition with plantation rubbers would not be very noticeable, as their output is relatively small; but in 1916 the case will be quite different. Even supposing that the demand for rubber keeps on increasing, the plantations will still be in a position to supply at least half of the demand. There are, furthermore, enormous opportunities for the plant physiologist in the cultivation and production of rubber. So far, very little has been done in this direction, as the plantation industry is still in its infancy; but it seems more than probable that careful experimentation will enable means to be devised whereby the yield of rubber per tree can be materially increased.

In the case of the sugar beet this increase in the yield has been accomplished with surprising success. It has been possible, by careful methods of cultivation and selection of the most advantageous conditions of soil, to raise the yield of sugar in the beet from 3 to 18 per cent. Undoubtedly, in the case of rubber, the problem is more complex than in the case of the sugar beet, but this field of investigation is still waiting for the pioneer, and I cannot help feeling that the possibilities are indeed large.

It must be seen, even on the supposition that synthetic rubber were to-day a commercial possibility, and that an article could be produced

equal to the plantation product, that the struggle for commercial supremacy would necessarily be a fierce one, with the advantage very much in favour of the plantation product.

In the case of indigo, the synthetic product had practically no competition to meet whatsoever. The production of natural indigo had been carried out under the crudest possible fashion, and the methods of obtaining the dye from the plant were even more crude. For some extraordinary reason, although the production of this dye stuff was of such extreme value to the textile industry, it always remained in the hands of the ignorant natives. Had the same amount of energy and skill been applied to the indigo plant that is now being applied to plantation rubber, the victory of synthetic indigo would probably still be in doubt. It must be granted that the commercial synthesis of indigo was the crowning technical achievement of the nineteenth century, but it must also be acknowledged that its fight for supremacy over the natural product was materially aided by the shortsightedness of the indigo planters. Rubber planters, on the other hand, have been keenly alive to the large possibilities which are to be derived from scientific methods of cultivation and production, and they have got such an infinite lead over the efforts of the synthetic chemist as to be in little danger of being vanquished for many decades to come.

I hope I have not been altogether unsuccessful in making plain some of the difficulties that confront commercial synthetic rubber. With our present day chemical methods it would be well nigh impossible to assure a uniform synthetic product. Within the next few years the Eastern plantations will be in a position to supply half the demand for rubber, and accordingly be in a position to wage a very subborn fight against any synthetic product. Finally, it seems more than probable that scientific investigations will enable the planter to increase the yield of rubber per tree, and thus put him in a still better position to combat the synthetic article.

I do not want to make such a rash statement as to assert that synthetic rubber will never be a commercial possibility, but I should be greatly surprised if there is anybody engaged in the rubber industry to-day who will have the opportunity of seeing synthetic rubber in open competition with the natural product.—From "The India Rubber World."

THE FERMENTATION OF CACAO AND OTHER CROPS.

As considerable attention is now being paid in tropical countries to the cultivation of cacao, any information on the subject, by experts in the business, cannot fail to be of interest to tropical planters. Under the above title a very useful book has been lately published by the author, Mr. Hamel-Smith, editor of "Tropical Life," London:—

This book (says the editor) has been published for several reasons, all culminating in the one—viz., to encourage and faciliate the crops

produced by even the smaller and smallest owners being carefully and scientifically prepared " to type," so as to cause the largest buyers to take an interest in them, and be able to buy them " forward," through the shipping and exporting firms, brokers, &c., in full confidence that the produce when delivered at their factories will be up to the required standard, and free from mould, worminess, insufficient curing, and other blemishes. At present the large numbers of small parcels of produce that come forward, varying in colour and quality, cause the planters to lose money, and the manufacturers to expend both time and money in trying to remedy defects that could be prevented at the outset.

Every endeavour has been made to bring together the most reliable information so far published on the intricate methods by which the above object can be achieved, and the encouraging remarks of Sir George Watt have caused the publishers to believe that the efforts of the editor and themselves to make the work as complete as possible have not altogether been without success. " I have read every word of your book on ' The Fermentation of Cacao,' " writes Sir George Watt in the foreword, " with absorbing interest, and must congratulate you on being able to bring out a book that will become a classic on the subject it deals with so ably. You have brought together the opinions of several experts of scientific eminence and practical experience, and these must be drawn upon by all subsequent investigators."

The possibility of making alcohol or vinegar from the refuse liquor is also discussed, whilst the editor, in the preface, quotes leading Press reports showing the demand on all sides for alcohol as a liquid fuel, a fact which, as he points out in the footnote on p. xxvii., coconut, sisal, and manila hemp planters should also carefully note.

Again, those who, whilst earning their living as planters, estate managers, Government experts, &c., have worked, and are working, so strenuously in the tropics to keep the mother country supplied with foodstuffs and raw material at a low price to suit the pockets of the million will, it is believed, appreciate the way in which the editor, on pp. xliii. and xliv. of the preface, calls for more recognition on the part both of the authorities and the general public on this side to the importance of the tropical planter to their factories and homes, and will be glad to see his suggestion that these men of peace should be trained at agricultural colleges in the tropics, *founded with public money*, to understand the handling and use of the machines and munitions of the art of peace as we have for years been teaching others at the expense of the public to understand and to handle the machines and munitions of the art of war. Without the man of peace, the man of war would die of starvation; surely, therefore, it will be wise of the public and various Governments to pay more attention to the training of these men of peace, in order that the prosperity and prestige of the Empire may be maintained.

Entomology.

SURFACE CATERPILLAR ON TAL* LANDS IN INDIA.

According to a report by E. J. Woodhouse, M.A., F.L.S., Economic Botanist to the Indian Government, and H. L. Dath, M.Sc.A., Assistant Professor of Entomology, much information has been gained concerning the depredations of the pest known as *Agrostis ypsilon* in several districts in Bengal, and the results have been published at some length in the "Agricultural Journal" of the Department of Agriculture, Behar and Orissa (April, 1913). It would appear that the cultivation of some areas has been abandoned on account of the damage done by the insect.

PLATE 139.—ANDRES-MAIRE TRAP AT PAIJIMA.
(BANDS LOWERED.)

We have not space to give the details, life history, &c., of the pest, but we wish to draw attention to the means adopted for trapping the caterpillar by means of the Andres-Maire traps. Caterpillars have frequently wrought much havoc in the wheat districts in Queensland, and are especially partial to barley. The trap in question was invented by Messrs. A. Andres and G. Maire, of Alexandria, for use in destroying the insect

* By tal lands are meant lands which are under floods during the monsoon. The soil is a heavy clay.

pests of cotton and bersum (Egyptian clover). The trap is only useful for insects which feed in the adult stage before laying their eggs. The moths are attracted at night by the sugary smell of the attractive liquid, which is smeared on bands hung up inside a cage, into which the moths can easily find their way, but, once inside, are prevented by its construction from getting out again. The moths feed on the liquid on the bands during the night, and on the following morning crawl down to the bottom of the cage, where they fall into a receptacle of water and kerosene, in which they are killed. The bands are charged with the attractive liquid every night, and are put out of use again in the morning to prevent bees, &c., getting caught in the traps. The actual manipulation of the trap is simple, and can be performed by a coolie. One trap is said to be sufficient for 100 acres.

As regards their efficiency, one trap was working for a month and no less than 2,268 *Agrotis* moths were caught, 81·4 per cent. of the moths caught being females. Besides these, many thousands of other moths and insects were captured. The cost of making the trap in India is about 50 rupees (exclusive of royalty), and the cost of providing the attractive liquid for a month, works out at 5 rupees, when the liquid is made locally. To work six traps, a trap operator and one or more assistants would be required.

Seeing that various kinds of insects are attracted to and caught by such a trap, it might possibly prove of value in keeping the fruit fly, pumpkin beetle, codling moth, orange moth, &c., in check in this State.

MOSQUITO DESTRUCTION WITHOUT KEROSENE.

The "Australian Sugar Journal" for 4th September takes the following interesting note from the "West India Committee Circular":—

"The Philippines have requested Dr. Alvin H. Seale to furnish them with a supply of mosquito fish (*Gambusia affinis*) for distribution in the Moro Province. Dr. Seale has established breeding stations in and he hopes to supply all parts of the islands with these fish. This mosquito fish, which appears to be closely allied to the 'millions' of Barbados, is very small, it propagates very rapidly, can exist where there is little water, and other fish do not feed on it. It was first found by Dr. Seale in Louisiana, and the doctor is convinced that the fact that people can live in the swampy regions of the south with little malaria is due to the existence of these fish in those parts. In 1898 Dr. Seale introduced these fish into Honolulu, where they are becoming a big factor in the elimination of the mosquito. Apart from the facility with which it can be propagated, the fish is also valuable, since it eliminates the necessity for scattering petroleum in the marshes. Dr. Seale made experiments in Manila, and found that one little fish ate between 600 and 700 mosquito larvæ in one night."

Science.

PROTECTION OF PLANTS FROM FROST.

Much interest has been taken of late on this subject, in consequence of articles which we published in the June, July, and September issues of this journal by Mr. Welsh, Mr. Holton, of Gladstone, and Mr. Cook, of Woowoonga. Several letters on the question have since reached us, from which we select one from a correspondent at Tambourine Mountain, "Nat Sine," who writes as follows:—

"In the September number of the 'Agricultural Journal,' under the heading of 'Protection of Plants from Frost,' your correspondent, Mr. G. A. Cook, of Woowoonga, is reported as stating that water contracts in freezing' . . . . &c. This is evidently a mistake, as if such were the case, ice would be heavier than water bulk for bulk and would not float.

"Roscoe states that water on freezing suddenly expands from 1 volume to 1·09 volumes, and that hollow balls of thick cast iron can easily be split in two by filling them with water, and closing with a tightly-fitting screw, and then exposing them to a temperature below 0 degrees Cent. (32 degrees F.). If water contracted in freezing, some rather disconcerting propositions would soon face the inhabitants of the temperate portions of this earth."

Mr. J. F. Coates, Harveston, Rockhampton, upholds Mr. Holton's theory in the following letter:—

"Several articles on the above subject have recently appeared in the 'Agricultural Journal'; and in the September issue another writer, Mr. G. A. Cook, endeavours to uphold what Mr. A. Holton, in the July issue, rightly terms 'a prevalent misconception of a well-known physical law.'

"The explanation of the phenomenon, as given by Mr. Holton, is entirely correct, and will be borne out by any hydraulic engineer or other competent authority.

"The fact that Mr. Cook has been connected with pumping machinery for twenty years and yet disputes Mr. Holton's statements, suggests that he was not strong in hydromechanics, nor was he keenly observant in connection with this trouble with bursting pipes.

"If Mr. Cook himself carries out his suggestion to Mr. Holton to experiment by filling a length of pipe with water, stopping up the ends and then freezing, he will find that, no matter how strong his pipe (and the plugs), the instant the water freezes the pipes will burst.

"No better or more convincing illustration of the fact of water expanding when frozen can be found than in the fact of ice floating on water—by reason, of course, of its lesser specific gravity.

"On reference to any book of engineering formulæ, it will be found that, as a matter of fact, water, when frozen, expands to almost one-tenth more than its original volume.

"With regard to the alleged actual beneficial effects to be obtained by applying water to frosted plants before they are thawed naturally by the sun, I say emphatically, Mr. Welsh's and Mr. Cook's statements notwithstanding, that they are not borne out by experiment.

"About a month ago several successive and fairly severe frosts were experienced here, and amongst other plants which suffered the first morning were some rows of tomatoes, bananas, and water-melons growing adjacent to an irrigation pipe line fitted with hose attachments.

"To convince one of the men employed in the garden here, who had read Mr. Welsh's letter on the water-sprinkling treatment, and was anxious to try it, I had some of each kind of the frosted plants sprayed with a hose before sunrise.

"The only effect noted was that the sprayed plants blackened and withered rather sooner than those not treated.

"The fact is that plants that are killed by frost are, to all intents and purposes, dead from the moment the sap freezes and bursts the cells, and no after-treatment can revive them any more than it can bring a dead body back to life."

Mr. Jas. K. Coutts, Bri-Bri, Eton Vale, Cambooya, writes on the same subject:—

"I have followed with interest the correspondence *re* the protection of plants from frost in the journal, and hope you will allow me to say a few words on the subject.

"I quite agree with both Mr. Holton and Mr. Cook as to water for safely thawing plants, as I have proved, time and again, with chrysanthemums kept under glass in Scotland for Christmas decoration; but I must beg to disagree with Mr. Cook as to the thawing of water bursting pipes, and would suggest a simple little experiment to prove the opposite of what Mr. Cook maintains. Let a tall glass vessel be filled with water, and a small thermometer placed in the bottom and one near the top; now place the whole where the temperature is below freezing point. At first both thermometers will fall; the lower one, however, more rapidly than the upper till it reaches about 40 degrees F., when it will become stationary. The upper one will continue to fall until it reaches 32 degrees F., and then the water will begin to freeze at the top, and in a short time the vessel will probably be cracked.

"The explanation of the above is that at first the cooler water from the top and sides of the vessel becomes more dense and falls to the bottom. When, however, the water attains the temperature of 34·4 degrees F., it has attained its maximum density; then instead of contracting it begins to expand slightly until it reaches 32 degrees F., when it begins to freeze and expands very quickly on becoming ice, which can be plainly seen in this experiment.

"If Mr. Cook wishes another and even more simple experiment, let him take two bottles, and three parts fill one and fill the other quite full and stopper firmly at 34·4 degrees F., and then place both where the temperature is considerably below 32 degrees F. (freezing point). In a short time he will find that the full bottle will break if it has been properly stoppered, while the three parts full one will remain intact."

Mr. A. Holton, Mooloolah, in reply to Mr. Cook, writes:—

"I note that in the current issue of the 'Queensland Agricultural Journal,' Mr. G. A. Cook, of Woowoonga, flatly contradicts my statement (which appeared in your July issue) *re* the prevalent misconception of the true cause of burst pipes due to frost. I find I have no recent standard work of Physics at hand to give you chapter and verse for the correctness of my statement, so must fall back upon an old copy of Deschanel's Natural Philosophy, edited by Professor Everitt, chap. xxiv., section 236, from which I extract the following:—'In passing from the liquid to the solid state, bodies generally undergo a diminution of volume; there are, however, exceptions, such as ice, silver, bismuth, and cast iron. The expansion of ice is considerable, amounting to about $\frac{1}{14}$; its production is attended by enormous mechanical force, just as in the analogous case of expansion by heat. Its effect in bursting water-pipes is well known. The following experiment illustrates this expansive force:—A tube of forged iron is filled with water, and tightly closed by a screw-stopper. The tube is then surrounded with a freezing mixture of snow and salt. After some time the water congeals, a loud report is often heard, and the tube is found to be rent.' Again, in chapter xxii., section 209:—'It has been found that the volume of water is least at 4 degrees Centigrade. At this temperature, the density of water is a maximum, so that if a quantity of water at this temperature be either heated or cooled it undergoes an increase in volume. This is a curious and unique exception to the general law of expansion by heat. It is in virtue of this anomaly exhibited by water in its expansion, taken in conjunction with the specific lightness of ice and the low conducting power of water, that the temperature at the bottom of deep pools remains moderate even during the severest cold, and that the lives of aquatic animals are preserved.'

"I trust that the above extracts will suffice to convince Mr. Cook, and will be of sufficient general interest to warrant their insertion in your valuable journal."

[This correspondence must now cease.—Ed. "Q.A.J."]

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

LEPIDIUM, Linn.

L. incisum? *Roth.* (Plate 140.) The figure here given is of a weed which seems likely to become a more or less troublesome pest. From what can be made out from the sample to hand, it is a Lepidium, one of the Cress family, and a form of a European species—*L. incisum,* Roth; but, not having a full diagnosis of that not over common plant, I refrain from publishing a description until what is required is to hand. The only deleterious properties generally recorded of species of this genus is that one is used by the South Sea Islanders to stupefy fish. From accounts we have of the present plant, its effect on cows is more alarming than that of the well-known Darling Pea. The figure here given, let us hope, may put readers of the journal on their guard; but we are not called upon to believe all we hear. The present figure is from plants received from Mr. J. R. D. Munro, Inspector of Dairies, Warwick. The account, sent with the specimen, of the effect upon cows was as follows:—"Causes the cows to become very restless, and rush about licking and kicking furiously at their sides and udders, unable to either lie down or stand still; udders very much inflamed; nostrils dry and brown; and mouth pink."

Specimens have been handed over to the Agricultural Chemist for examination.

Order LEGUMINOSÆ.

GOMPHOLOBIUM, Sm.

G. virgatum, *Sieb.,* **var. Clarkiæ,** *Bail.,* n. var. (after Miss H. D. Clark). (Plate 141.) Plant 2-3 ft. high, of a clean upright not a twiggy growth. Leaves on short petioles, leaflets about 1½ in. long. Flowers larger, standard ¾ in. across.

Hab.: Kanaipa, Stradbrooke Island, *C. T. White* (Field Naturalists' Club Excursion, September, 1913).

Order LABIATÆ.

SALVIA, Linn.

S. Verbenaca, *Linn.* Wild Sage. A coarse, more or less hairy, erect perennial, 1 to 1½ or rarely 2 ft. high, and slightly branched. Lower leaves stalked, ovate, coarsely toothed or lobed, and much wrinkled, the upper ones sessile, broader, and shorter; the bract-like floral leaves small,

PLATE 140.—LEPIDIUM INCISUM (?) *Roth.*

A—Lower portion of plant with radical leaves. B—Upper portion of plant. C—Flower. D—Capsule. E—Seed. C-E—Enlarged.

PLATE 141.—GOMPHOLOBIUM VIRGATUM, *Sieb.*, VAR. CLARKIÆ, *Bail.*, *n. var.*

heart-shaped and entire. Flowers small, blue, in whorls of 6, forming terminal hairy spikes. The corolla seldom twice the length of the calyx. *S. horminoides,* Pour.

Hab.: Occuring as a naturalised weed near Warwick, *J. R. D. Munro.* Also occurs as a weed of waste places in Europe and Asia.

Order CHENOPODIACEÆ.

CHENOPODIUM, Linn.

C. ficifolium, *Sm.* An annual plant about 1-2½ ft. high, of an ashy green. Stems erect, ribbed, simple or branched. Leaves of a glaucous green, for the most part about three times as long as broad, tri-lobed-hastate, the lateral lobes usually with a tooth at the base, the middle lobe large, oblong—lanceolate, entire or sinuate—toothed. Glomerules farinaceous, in a narrow panicle, leafly in the lower part. Perianth concealing the fruit. Seed about ½ line diam., horizontal, dull, punctate, thick and obtuse at the edge.

Hab.: This European plant has recently made its appearance as a weed in the Brisbane Botanic Gardens and Government Domain.

Order PROTEACEÆ.

BANKSIA, Linn. f.

B. serrata, *Linn.* A tree, the young shoots tomentose or villous and sometimes densely so with richly coloured, ferruginous, very deciduous hairs. Leaves oblong-lanceolate, acute or truncate, regularly and deeply serrate, tapering into a petiole, 3 to 6 in. long, ½ to 1 in. wide, coriaceous, flat, hoary or rarely white underneath, with parallel transverse veins. Spikes oblong-cylindrical or rarely globular, 3 to 6 in. long, very thick. Perianth shortly silky, the tube above 1 in. long, the laminæ narrow, acuminate, nearly 3 lines long, the silky hairs longer than those of the tube. Style at length straight, with a cylindrical, somewhat furrowed, stigmatic end, about ½ line long, and thickened at the base. Capsules very prominent, tomentose, thick and hard, obliquely rounded or ovate, above 1 in. broad.—Benth., Flora Austr., v. 556.

Hab.: Russell Island, *C. T. White* (Field Naturalists' Club Excursion, September, 1913).

Order ORCHIDEÆ.

SARCOCHILUS, R. Br.

S. Longmanii, *Bail.,* Q'land Agric. Jl., XXIII. (1909), 261, and XXVIII. (1912), 449, Pl. 91; Compreh. Catal. Q'land., Pl. 536, fig. 527 bis. (Plate 142.) I have recently received a living specimen of this plant from Mr. J. A. Beck, Toowoomba, which differs slightly from the type:—Leaves numerous (8 on the plant received), 1-3¼ in. long and 6-8 lines broad, apex blunt, minutely apiculate, tapering towards the base, the midrib alone prominent. Flowers similar, but the lateral lobes of the labellum about half the length of the petals; all of which differences the typical plant might be allowed to assume.

PLATE 142.—SAROCHILUS LONGMANII, *Bail.*

Order FUNGI.

The following additions to our Fungi have been determined at the Royal Botanic Gardens, Kew, England:—

GASTEROMYCETEÆ.

Calvatia rubro-flava, *Cragin.*

Hab.: On flower beds, Brisbane Botanic Gardens, *F. M. Bailey.*

The Director, Royal Botanic Gardens, Kew, writes me to say that the fungus previously determined as *Bovista olivacea,* Cke. et Mass. (see Q'land Agric. Jl., XXVIII. (1912), p. 357) is really the above species.

PYRENOMYCETEÆ.

Leptosphaeria sacchari, *v. Breda de Haan.* Ring spot of sugar-cane.

Hab.: On leaves of the sugar-cane (*Saccharum officinarum*), Cedar Creek near Samford, *C. T. White.*

Physalospora phylctaenoides (*Berk. et Curtis*), *Sacc.*

Hab.: On dead stems of *Dolichos falcatus,* Brisbane, *C. T. White.*

HYPODERMEÆ.

Uromyces appendiculatus (*Pers*), *Link.*

Hab.: On leaves of *Dolichos falcatus,* Brisbane, *C. T. White.*

HYPHOMYCETEÆ.

Cladosporium epimyces, *Cke.*

Hab.: On pileus of *Agaricus* (*Lepiota*) sp., Rosewood, *C. T. White.*

Cercospora personata, *Ell.*

Hab.: On leaves of the Earth Nut (*Arachis hypogæa*), Rosewood, *C. T. White.*

MYXOMYCETEÆ.

Stemonitis splendens, *Rost.*

Hab.: On logs, Goodna Scrub, *C. T. White.*

ORCHIDS AND THEIR SCALE PESTS.

Orchid-growers in Queensland have not as yet, so far as we know, been troubled with many insect pests, but that these exist is shown by the following paper by B. B. Whitney, State Quarantine Inspector, San Francisco, Cal., published in the Monthly Bulletin of the State Commission of Horticulture (Vol. II., No. 7, July, 1913):—

The orchids form a vast group of plants (about 10,000 species). Immense sums are paid for new plants. The price paid for novelties causes collectors to scour every part of the tropics, risking their lives in the mountains, jungles, and fever-haunted swamps in search of these plants. It is probable that large sums for single plants have been paid more frequently for orchids than for any other class of plants. Large quantities of orchids are annually imported to replenish hot-houses.

There never has been any distinct orchid craze followed by a severe reaction, as in the case of the tulip, dahlia, zinnia, camellia, &c.; but the interest has gradually extended, and is likely always to increase steadily.

Orchids may be divided into three classes—saprophytes, epiphytes, and terrestrial orchids. True parasites are not known to occur in this family.

The saprophytic orchids are the most reduced forms devoid of chlorophyll, and depending for their carbon food upon the organic matter of the humus in which they grow. The subterranean stem or rhizome consists of a much knotted coral-like mass, which takes the place of roots. In most species the rhizome has been found to be infested with a fungus, by means of which organic matter of the humus is absorbed and transformed into compounds available to the plant.

The epiphytic orchids exhibit the most varied forms. These inhabit branches of trees, dead trunks, and often barren rocks, in tropical or subtropical countries where a part of the year is unfavourable to growth. As a result of this they have developed special food reservoirs, pseudobulbs, terminating each season's growth. In this group there are comparatively few plants of attractive habit.

The terrestrial species include some of the largest and most stately orchids of the tropics as well as most of the orchids of the temperate zone. Many of these are ornamental even when not in flower.

Fruit-growers, as a rule, are not much concerned about orchids, neither, as a rule, is the quarantine officer, but the latter is vitally concerned about the insect pests that he finds invariably associated with the consignments of these valuable plants that he very often is called upon to examine. The following list of scale insects that the writer has detected and caused to be destroyed upon orchids entering the port of San Francisco, contains the names of a great number that are well-known tree pests in different parts of the world. The following list contains all the species listed by Cockerell as attacking orchids, excepting seven. It also contains ten species not listed by the same author:—

Conchaspis sps.	Mexico
Asterolecanium epidendri ..	South America
Ceroputo and *Pulvinaria* sps.	South America
Vinsonia stellifera	Mexico
Eucalymanatus perforatus ..	England
Coccus acuminatus	Hawaiian Islands
Saissetia hemisphærica ..	Mexico
Diaspis boisduvalii	South America and England

Diaspis cattleyæ ..	England
Diaspis echinocacti	South America
Hemichionaspis aspidistræ ..	England
Hemichionaspis sps.	Manila
Fiorinia sps.	Manila
Aspidiotus cyanophylli ..	Mexico
Aspidiotus hederæ	Conservatory, Golden Gate Park, San Francisco
Chrysomphalus alienus ..	London
Chrysomphalus aonidum ..	Conservatory, Golden Gate Park, San Francisco
Chrysomphalus biformis ..	South America
Chrysomphalus biformis cattleyæ	Jamaica
Chrysomphalus dictyospermi var. *arecæ*	Golden Gate Park, San Francisco
Lepidosaphes cocculi ..	Manila
Lepidosaphes pallida ..	Java
Lepidosaphes sps.	South America
Parlatoria mangiferæ	Singapore
Parlatoria pergandii ..	Conservatory, Golden Gate Park, San Francisco
Parlatoria proteus	Orient
Parlatoria sps.	Manila
Parlatoria pseudaspidiotus ..	Recorded in India

The following seven species listed by Cockerell have not been taken so far at the port of San Francisco:—

Conchaspis angræci.
Asterolecanium aureum.
Pulvinaria (brassiæ) floccifera.
Ctenochiton elongatus.
Coccus hesperidum.
Fiorinia stricta.
Lepidosaphes pinnæformis.

The working out and identifying of the foregoing material was a task of some magnitude, considering that all of it had to be done during the rare intervals that have occurred in the regular routine work of the quarantine service; but the series of splendid specimens that this work has added to the State collection amply justified the effort.

General Notes.

HOW TO VANQUISH THE MOSQUITOES.

MOSQUITO DESTRUCTION BY CHEMICALS AND FISH.

Some years ago (1899) the "Public Health Journal" (U.S.A.) stated that the mosquito pest can be easily abated by the use of a very simple remedy. It is stated that but two and a-half hours are required for the development of the full-grown mosquito from a mere speck—its first stage. It can be instantly killed either in its first infancy, or at maturity, by contact with minute quantities of permanganate of potash—the cheap purple Condy's Fluid so much used for disinfecting purposes. It is said that a solution of the salt containing only 1 part in 15,000 of water, distributed in the swamps where the mosquito breeds, will oxidise a 10-acre swamp, kill its embryo insects, and keep it free from organic matter for thirty days at a cost of 25 cents (12½d.). A single pinch of permanganate will kill all the germs in a 1,000-gallon tank.

In January, 1909, we wrote as follows on the value of small fish as mosquito destroyers:—

Some years ago we noticed large numbers of mosquito larvæ in a small waterhole at Nundah. A few months later none were to be found in it, but by some means or other (probably by the help of birds or cattle, carrying fish spawn on their feet), this waterhole became alive with tiny brilliantly-coloured fish, about 2 in. long. Doubtless these little fish destroyed the larvæ. Confirmation of this theory we now find in an article in the London "Times," republished in the "Journal of the Jamaica Agricultural Society" for September, 1908. It is as follows:—

"It has long been known that Barbados is the only West Indian Island that is absolutely free from malaria and from the presence of the anopheles mosquito. Major Hodder, R.E., in his report to the War Office three years ago on the drainage works that were then being carried out in St. Lucia, came to the conclusion that there was some hitherto undiscovered reason why the anopheles failed to propagate its kind in Barbados, where the culex was abundant. It appeared from his observations that the anopheles could, or did, only breed on the ground level; none of its larvæ being found in tanks which were raised a few feet from the earth, nor even in those which were actually resting on the ground. The culex can, on the other hand, breed in the gutters on the roofs of high buildings as easily as in the low-lying swamps and pools. Mr. friend Mr. C. Kenrick Gibbons, who had given a good deal of attention to the matter, pointed out at once that all the pools and swamps in this island were stocked with swarms of a tiny fish (known locally from their vast numbers as 'millions'), and that their favourite food was the larvæ of the mosquito. It is obvious that any species of that insect

which is unable to breed above the ground level must fall a prey to this enemy. The fish has been identified by Mr. Boulenger, F.R.S., of the British Museum, as *Girardinus poeciloides.* Some specimens were successfully got to England, and flourished for some time in the insect house at the Zoological Society's Gardens. Mr. Gibbons' suggestion that the 'millions' should be imported into malarial districts in other islands has been acted upon, and with felicitous results. For instance, the Country Health Board of Antigua, 'being convinced of the useful part played by these fish in consuming mosquito larvæ, have arranged for their systematic distribution throughout the ponds and streams of the island.'' Similar news comes from Jamaica, whither a consignment of the fish was sent in November, 1906. The secretary of the Agricultural Society writes that the tanks at the Titchfield Hotel are full of them, and that he had been informed that there had been a marked diminution of fever round about, the 'millions' evidently accounting for the mosquito larvæ. They have also been sent to Colon and to British Guiana. One cannot help wishing that these useful little fish were given a trial in the deadly districts of Africa. Like the malarial mosquito, the insects which convey the terrible diseases which are endemic there pass the larvæ stage of their existence in water. One may add in this connection that the Swedish consul at Frankfort has discovered a small fish ('the blue-eyed') which feeds on mosquito larvæ, and that, at the request of the Italian Government, some are to be, or have been, sent to the Campagna, where so much has been done in recent years to diminish malaria.''

To this, the editor of the Jamaica journal above mentioned adds:—

In many of our streams and ponds here, the same little fish called "millions" in Barbados and "ticky-tickies" here are found, and many people have used them in their tanks. The consignment mentioned as having been got from the Barbados was closely examined, and the "millions" found to be identical with our "ticky-tickies." Tanks are very favourite breeding places for mosquitoes, and we are afraid it is only a few who appreciate the necessity of preventing the mosquitoes breeding—for their own comfort and well-being. We are glad to draw the attention of every reader to this fact, that the little "ticky-tickies" live on the larvæ of mosquitoes, and that in districts subject to these insects, and where tanks and ponds are used, this little fish should be put in these. This does not, however, do away with the fact that mosquitoes breed wherever a little stagnant water collects, and care should be taken to prevent this as far as possible, by cleaning these places with kerosene.

The "Tropical Agriculturist," Ceylon, takes the following suggestion from the "Madras C. C. Magazine":—

A trap for catching mosquitoes has been devised by Mr. Maxwell Lefroy which is simple and effective. It consists of a small box, about 12 in. square and 9 in. wide, with hinged lid which has a small orifice with a sliding cover. The box is lined with dark-green baize, and has a tin floor. The trap is placed in a shady corner of the room, and the

mosquitoes, when they enter the house in the morning, seclude themselves in it to escape the sunlight. The lid is then shut, and a teaspoonful of benzine injected into the box. Mr. Lefroy found that in a short time the mosquitoes succumbed, and by continuing this process for a month caught and killed over 2,300.

As regards fish (" millions ") as mosquito destroyers, the Health Commissioner, Dr. Elkington, who has been waging determined war against these pests, has said that " the use of small fish in tanks has given good results. The streams of Southern Queensland contain several species of larvæ-eating fish which are quite as effective as the much advertised " millions " of Barbadoes. One fish, 1½ in. long, will account for 50 or more larvæ in a day. The ' Green Perchlet,' ' Sun Fish,' and ' Firetail ' are all useful species."

This exactly agrees with our experience at Nundah in 1883, when the mosquitoes were very troublesome, until the small fish multiplied in the waterholes.

TO GET RID OF ANTS.

The following methods of destroying or banishing ants of various kinds have been described in this journal at intervals since 1898. We still have so many inquiries on this subject that we now publish a collection of remedies, copies of which may be obtained on application to the Department.

DESTRUCTION OF ANT HILLS.

As the hot weather approaches, those pests of the State, ants of all sorts and descriptions, become lively, and begin to infest house and field. Then, on all sides, the question is heard: " How can we get rid of the ants? "

In the case of the extensive " antdoms " of the blue meat ant, a good way to exterminate them is to cover the gravelly nests with weed chippings from the garden. This proceeding appears greatly to trouble the insects, probably because the dry weeds prevent them from safely depositing the quantities of small stones and gravel they carry up from below the surface of the soil.

Failing this remedy, the best method of dealing with these ants in a large nest is to make several holes with a bar or broom handle to the depth of a few inches in different parts of their habitation. Pour into each hole about a tablespoonful of carbon bi-sulphide, and then cover the whole nest with a blanket. The heavy fumes of the insecticide will permeate the ant hill, killing all insect life. The operation may be made more effective by exploding the vapour under the blanket by the aid of a light on the end of a pole. This drives the poisonous fumes throughout the nest, rendering them more fatal to the inmates. The best time for this treatment is towards the evening, when most of the ants will be at home.

SOLDIER AND JUMPER ANTS

can be effectually destroyed by this process.

Another good remedy is to pour half a pint of gasoline into the hill or nest, and set it afire. The gasoline will instantly spread through all the galleries of the nest, and, as the heat on the surface increases, the gas will generate in the utmost recesses and the fire will cook the ants. Half a pint of gasoline will burn from three to eight hours, and every ant in the nest, or attempting to enter, will be destroyed.

TO CLEANSE A CUPBOARD

infested with red or black ants, all the shelves should be washed with carbolic acid and water, or carbolic soap. If the scent of the carbolic is offensive, as it is to some persons, use the following:—A large lump of ammonia dissolved in hot water, and more cold water added. The proportion is—ammonia the size of a hen's egg to a quart of water. Brush the shelves well over with it. The ants will quickly leave, as they dislike the scent of ammonia.

TO KEEP ANTS AWAY FROM TREES.

Take White Lime (slaked)	6 quarts.
Kerosene oil	½ pint.
Turpentine	1 wineglass.
Soft soap	5 lb.
Cow manure	3 quarts
Water	16 quarts

Mix the whole thoroughly together, and apply freely with a paint brush to the trunks of trees or shrubs.

It is said that trees can be protected against ants by saturating woollen strings with castor oil, and tying them tightly round the trunk. The ants go up as far as the strings, but none will cross them. Cotton strings will not do. Woollen yarn must be used.

TO GET RID OF BLACK ANTS.

Mix 10 parts of sugar with 100 parts of water, and boil. Cool, and then add 1 part of tartar emetic, and stir. Set this about in tins covered with muslin or wire netting. A very similar method is to use in exactly the same way a mixture of 1 oz. of jam or syrup and 10 grains of finely powdered corrosive sublimate.

Another remedy, involving no poison, is to soak a piece of sponge in sweetened water. When it is full of ants, drop it into boiling water, and sweeten afresh for a second lot of ants. Ants are curously intelligent when once they have grasped the idea; so they keep away.

A third remedy: Mix flour, sugar, and arsenic to the consistency of putty with water, and place pieces of the mixture about the nests of the ants. If an examination is made in a few days after using this remedy, hundreds of dead ants will be found in the vicinity of the poison; and it is very unlikely that the ants will reappear on a spot where the mixture has been used.

TO PREVENT ANTS CLIMBING FRUIT TREES.

If chalk is rubbed on the bark of a tree, it will absolutely prevent ants from climbing. If they are above it, they fall the instant they set foot on the chalk when descending. They appear to lose their foothold. The correspondent who supplies this information mentions his experiment with a nectarine tree which was covered with black aphis. Observing that there was a continuous stream of black ants ascending and descending, he smoothed the bark of the stem to a width of about 6 or 7 in., and rubbed this space with chalk. The chalk was renewed from time to time as it fell or was washed off. That year there was not an aphis or black leaf on the tree, nor had there been any since. The ants, cut off from their food supply, were exterminated. "A chalk ring," he says, "drawn round a sugar ants' nest is equally effective." This is worth a trial, as, if successful, chalking the legs of tables and meat safes would preserve the contents from the ants.

Another way of preventing ants from climbing is said to be cheap and effective. Tie a rabbit skin (upside down, tail up the tree), fur outwards, tightly round the stem. The ants start to climb up the fur, and as they reach the end of each single hair, the hair drops and lets them down. The ants always give it up as a bad job.

REMEDIES FOR WHITE ANTS ATTACKING LIVING TREES.

There are two ways in which the pests may be got rid of—one by arsenical poisoning; the other by the use of bisulphide of carbon, as already described. For the first plan, get 3d. worth of arsenic, and pound it as fine as flour. Next, collect as many ants as possible, mix the ants with the arsenic, some molasses, and a little soil. Make this into a ball, and place it near the ants' nest. The living ants will devour the dead ones, and their followers will devour them. Thus there will be an end of them.

A good remedy is apterite, which is destructive to most insect life when chipped into the ground, and is not harmful to plants.

Sugar and arsenic spread between slips of pine wood, and covered with an inch of soil, is a good trap for white ants.

GREEN HEAD ANTS.

These are most difficult to deal with, as they make their nests in inaccessible places and run long galleries out to some distance. Unless the nests can be located and bisulphide poured into them, there is little hope of getting rid of them.

ANT EXTERMINATION GENERALLY.

For the extirpation of ants the following remedies are good. To be effective, they require attention and perseverance. It is well to find their main burrow or nest, if possible. Arsenic is sure destruction to them, but it is dangerous to handle:—

Air-slaked lime plentifully dusted in warm dry weather over and around the hills, or in the house or other places infested, will cause the ants to vacate them in a short time.

Snuff: Dust a little snuff upon the floor of the rooms or pantry.

Draw a thick chalk line around a smooth tree or across an upright board or post, and they will not pass over it.

Camphor: Put a piece of camphor, the size of a filbert nut, into 2 quarts of hot water. When cold, apply to pot and other plants, and the insects will be driven off without injury to the plants.

Mix together 1 part of calomel and 10 parts of finely powdered white sugar, and lay it in little heaps about their nests and runs. The ants will eat it and die.

Coal oil, mixed with six times its bulk of water, sprinkled over the nests every few days, will kill and drive them away.

Pans or saucers, nearly filled with honey or sweet oil, attract ants, and they are drowned in it.

Flowers of sulphur, ½ lb.; potash, 4 oz. Set in an earthen vessel over the fire until dissolved and united. Afterwards beat to a powder. Infuse a little of the powder in water and sprinkle in places infested with ants.

To Destroy Black Ants: A few leaves of green wormwood scattered among the haunts of black ants will drive them away.

Red Ants: Powdered borax sprinkled around will exterminate both red and black ants.

Make holes in the ant hills, 6 in. deep and 1 ft. apart, with an iron or zinc tube fitted with a wooden stake. Withdraw the stake. Pour 1 tablespoonful of bisulphide of carbon down the tube. Withdraw the tube and stop the hole immediately. Bisulphide of carbon is very inflammable.

USES FOR LEMONS.

No family (writes "Garden and Field") should be without lemons. Their uses are almost too many for enumeration.

The juice of a lemon in hot water, on awakening in the morning, is an excellent liver corrective, and for stout women is better than any anti-fat medicine ever invented.

Glycerine and lemon juice, half-and-half, on a bit of absorbent cotton, is the best thing in the world wherewith to moisten the lips and tongue of a fever-parched patient.

A dash of lemon juice in plain water is an excellent tooth wash. It not only removes tartar, but sweetens the breath.

A teaspoonful of the juice in a small cup of black coffee will almost certainly relieve a bilious headache.

The finest of manicure acids is made by putting a teaspoonful of lemon juice in a cupful of warm water. This removes most stains from the fingers and nails, and loosens the cuticle more satisfactorily than can be done by the use of a sharp instrument.

Lemon juice and salt will remove rust stains from linen without injury to the fabric. Wet the stains with the mixture and put the article in the sun. Two or three applications may be necessary if the stains are of long standing, but the remedy never fails.

Lemon juice (outward application) will allay the irritation caused by the bites of gnats or flies.

Lemon peel (and also orange) should be all saved. They are a capital substitute for kindling-wood. A handful will revive a dying fire.

THE KOOKABURRA AS A SNAKE-KILLER.

Most people in Australia know that the Kookaburra, or Laughing Jackass, or, as it is also called, the Gigantic Kingfisher, is a determined enemy of snakes, which form part of their food. A pair of Kookaburras will, as we have seen several times, attack a fairly large black or brown snake, swooping down on it, carrying it high into the air and dropping it, repeating the process until the reptile has been killed. The illustration shows a young Kookaburra in the act of swallowing a young black snake. It was picked up in Mr. F. Macpherson's garden, at South Brisbane, and had either been choked in the act of swallowing the reptile, or had been pounced upon, when thus engaged, by a prowling cat. Kookaburras are wisely protected by law, and it cannot be two strongly impressed upon young sportsmen who, with pea rifles, shoot any birds they come across —sometimes, unfortunately, meeting with sad accidents owing to carelessness in handling the weapon—that these birds are most valuable aids to keeping down snakes and other vermin.

BANANA FLY.

The Assistant Entomologist's Report on the Banana Fly will appear in the December issue of the journal.

TO GET RID OF FLEAS.

Dr. L. O. Howard, Chief of the Bureau of the United States Department of Agriculture, writes to "Science":—"Mr. E. M. Ehrhorn, the well-known entomologist, gives me the following:—Fill a soup plate with soapsuds; in the centre place a glass of water with a scum of kerosene on top; place the soup plate on the floor in an infested room, and set fire to the kerosene at night. Fleas in the room will be attracted, and will jump into the soapsuds."

THE TREWHELLA "MONKEY" WINCH.

This handy, light, powerful machine has been introduced by Messrs. Trewhella Bros. Proprietary, Limited (Trentham, Victoria), to meet the demand for a more powerful machine than their well-known "Monkey" Jacks, and those who have used it say that it is the most economical, powerful, safe, and satisfactory device of all hand-power stumping machines. Numbers of them are being used in the United States and other countries. It is built on the double action pawl and ratchet principle, and its light weight allows of its being easily and quickly moved from one point to another by two men. The cost of operation is small, as the apparatus can be worked by one, two, or three men as desired. An American farmer says that he travelled 20 miles to see the machine in operation. The agent attached it to a standing tree (fir) about 36 in. in diameter, placing the cable about 12 ft. up the tree. The farmer then took hold of the lever and pulled the tree down, with no other assistance, in eight minutes. He bought the machine, and afterwards pulled all the stumps on 30 acres of land without expending a cent for repairs. As showing the enormous power of this simple apparatus, he hitched a 1,600 lb. draught horse to an ordinary stump-puller, and failed to move the stump. He then attached the "Monkey Winch" to the same stump and pulled it out quite easily, roots and all, in 7½ minutes, by himself. Working direct from the drum, it exerts a pulling force of 12 tons, and with the snatch block, 24 tons. The price of the machine is, at present, £22 10s., and the Queensland agent is Mr. Arthur Robinson, 549 Queen street, Petrie's Bight, Brisbane.

Plate 143.—Young Laughing Jackass Swallowing a Black Snake.

Answers to Correspondents.

ORANGE TREE SCALE.

N.C.L.—

If you will send your name and address, we will forward you a pamphlet on citrus culture which contains the information you ask for. Anonymous communications are not replied to in the journal.

CULTIVATION OF PASSION FRUIT.

NEW CHUM, Moreton—

The passion fruit is best propagated by seeds. Any ordinary open soil with manure will grow it to perfection, although a rich, peaty soil, moist, but *not wet,* would be the most suitable. The best manure is fresh cow manure.

Plant during spring. If run on a trellis, the plants should be 10 to 15 ft. apart. The vines do not, as a rule, require tying to wire, as the tentrils are long, strong, and clinging. All passion vines greatly exhaust the soil, so that occasional manuring is absolutely necessary. Treat the plants as you would peach trees—i.e., they should be summer-pruned by nipping off the ends of the fruit-bearing laterals. They are very hardy and require little attention. They do not suffer much from frosts. There is a large passion fruit, the size of a good big orange, the seeds of which may be obtained from Brisbane seedsman—Thos. Wood, George street, or Petersen, George street. The great Granadilla, which is a very large species of passion fruit, may be cultivated in the same manner.

YIELD OF COWPEAS PER ACRE.

"H.," Oatlea, Kingaroy—

The crop of seed depends, says Mr. Brooks, altogether on the variety sown, the soil, the climatic conditions, and the method of sowing; and it was with these factors in view that he set down the yield at from 30 to 60 bushels per acre. He also stated that, no matter what the habits of the variety, whether bush or trailing, a large development of bush or vine invariably means a light crop of pods. This was also the opinion of Mr. A. H. Benson, who set down the *average* yield at from 15 to 20 bushels; and of Mr. H. A. Tardent, who based his estimate upon the fact that, as a rule, there are from 20 to 40 pods to a plant, each pod containing from 10 to 15 beans, which would mean from 25 to 35 bushels per acre. Cowpeas have been sold, in times of scarcity, at £1 per bushel. This means, at the estimate of 60 bushels per acre, £60. But even at 10s. per bushel, a crop of 25 bushels per acre would prove very remunerative. We have no information as to the record crop, but one farmer, mentioned by Mr. Brooks in his paper on "The Cowpea as a Seed Crop," in this journal (January, 1913), made a clear profit of £30 on one acre.

MANURE FOR COTTON.

INQUIRER, Ipswich—

As far as we know, manure has rarely been used on Queensland cotton fields. On very poor or worn-out soils the land could be advantageously manured. Any manure for cotton should contain 20 lb. nitrogen, 20 lb. potash, and 60 lb. soluble phosphoric acid.

A manure which will contain these constituents is composed of—

100 lb. ammonium sulphate	=	20 lb. N
40 lb. potassium sulphate	=	20 lb. K_2O
3 cwt. 18 per cent. superphosphate	=	60 lb. P_2O

TO MAKE OILSKIN OVERALLS.

"BUSHMAN," Cairns—

In the good old days of sailing vessels, sailors used to make their own oilskins and sou'-westers when they could get the necessary materials from the slop chest. The jacket and trousers are made of strong canvas, cut to shape. The canvas is then treated with a thin coat of boiled linseed oil, and hung up to dry. When perfectly dry, apply another coat of oil and let that dry. Two or three coats of oil will be needed, each being allowed to dry before the next application.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6 28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5 35	5·25	5·49	4·56	6·8	4·46	6·31
6	5.58	5·36	5·24	5·49	4·55	6 9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	5·53	5·38	5 19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5 52	4·52	6·12	4 46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6 15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6 39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6 21	4·50	6·42
23	5·38	5·43	5·6	5.59	4·47	6·22	4 51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6 23	4·52	6·43
26	5·35	5·45	5·3	6·1	4·46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6 26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

		H. M.
1 Sept.	● New Moon	6 38 a.m.
7 "	☾ First Quarter	11 6 p.m.
15 "	○ Full Moon	10 46 "
23 "	☽ Last Quarter	10 30 "
30 "	● New Moon	2 57 "
7 Oct.	☾ First Quarter	11 46 a.m.
15 "	○ Full Moon	4 7 p.m.
23 "	☽ Last Quarter	8 53 a.m.
30 "	● New Moon	12 29 "
6 Nov.	☾ First Quarter	4 34 a.m.
14 "	○ Full Moon	9 11 "
21 "	☽ Last Quarter	5 56 p.m.
28 "	● New Moon	11 41 a.m.
6 Dec.	☾ First Quarter	12 59 a.m.
14 "	○ Full Moon	1 0 "
21 "	☽ Last Quarter	2 16 "
28 "	● New Moon	12 59 "

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept. 1913.	Sept. 1912.
North Coast.	In.		In.	In.
Atherton	0·49	11	Nil	0·48
Cairns	1·17	25	0·08	0·75
Cardwell	1·37	25	0·04	1·24
Cooktown	0·59	25	0·49	0·19
Herberton	0·45	25	0·05	0·53
Ingham	1·17	20	0·04	0·63
Innisfail	3·16	25	0·04	2·65
Mossman	0·79	5	0·32	1·80
Townsville	1·18	23	Nil	Nil
Central Coast.				
Ayr	2·08	25	0·02	Nil
Bowen	1·23	25	0·28	Nil
Mackay	1·87	25	0·24	0·02
Proserpine	2·40	10	0·25	Nil
St. Lawrence ...	1·38	25	0·46	0·07
South Coast.				
Crohamhurst ...	2·10	20	3·98	0·19
Biggenden	1·48	14	4·11	...
Bundaberg	1·89	25	1·52	0·22
Brisbane	2·06	62	2·54	0·43
Childers	2·03	17	2·44	0·05
Esk	2·34	25	3·07	0·52
Gayndah	1·61	25	3·41	0·30
Glasshouse M'tains	...	...	*	3·32
Gympie	2·19	25	5·10	Nil
Kilkivan	1·66	25	4·52	0·21
Maryborough ...	1·87	25	1·41	Nil
South Coast—continued:	In.		In.	In
Nanango	1·97	25	2·98	0·37
Rockhampton ...	1·43	25	0·29	Nil
Woodford	2·20	25	2·81	0·53
Yandina	2·21	19	2·79	0·18
Darling Downs.				
Dalby	1·74	22	1·47	0·87
Emu Vale... ...	1·86	17	3·06	1·30
Jimbour	1·75	24	1·62	0·54
Miles	1·66	25	0·90	0·41
Stanthorpe ...	2·33	22	1·75	1·65
Toowoomba ...	2·20	22	1·41	1·08
Warwick	2·03	22	2·25	1·50
Maranoa.				
Roma	1·55	21	0·75	0·28
State Farms, &c.				
Gatton College ..	1·66	14	1·40	0·53
Gindie	0·95	13	0·38	Nil
Kamerunga Nurs'y	1·13	23	0·02	...
Kairi	...	...	*	...
Sugar Experiment Station, Mackay	1·63	16	0·19	...
Bungeworgorai ...	...	...	0·81	0·22
Warren	...	...	0·34	...
Hermitage ...	1·56	7	2·48	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1913.

Article.		OCTOBER. Prices.
Bacon, Pineapple	lb.	10½d. to 11d.
Bran	ton	£5 10s.
Butter	cwt.	107s.
Chaff, Mixed	ton	£3 10s. to £5 10s.
Chaff, Oaten (Local)	,,	£3 to £5 10s.
Chaff, Oaten (Victorian)	,,	£6 to £7 15s.
Chaff, Lucerne	,,	£4 to £5 15s.
Chaff, Wheaten	,,	...
Cheese	lb.	6½d.
Flour	ton	£9
Hams	lb.	1s. 3d.
Hay, Oaten (Victorian)	ton	£5 10s. to £6 10s.
Hay, Lucerne (Prime)	,,	£4 5s. to £4 15s.
Honey	lb.	2¾d. to 3d.
Maize	bush.	3s. 7½d.
Oats	,,	3s. 10d. to 4s.
Onions	ton	£8 10s. to £10
Pollard	,,	£5 10s.
Potatoes	,,	£7 10s. to £8 10s.
Potatoes, Sweet	cwt.	2s.
Pumpkins	ton	£3 10s.
Wheat, Milling	bush.	3s. 6d. to 3s. 7d.
Eggs	doz.	8d. to 10d.
Fowls	pair	3s. 6d. to 6s.
Geese	,,	6s. to 8s. 6d.
Ducks, English	,,	3s. 3d. to 4s. 6d.
Ducks, Muscovy	,,	4s. 9d. to 5s. 8d.
Turkeys (Hens)	,,	6s. to 9s.
Turkeys (Gobblers)	,,	15s. to 19s.

SOUTHERN FRUIT MARKETS.

Bananas (Fiji), G.M., per case	18s. 6d. to 19s.
Bananas (Fiji), G.M., per bunch	4s. to 10s.
Bananas (Queensland) per case	12s. to 14s.
Bananas (Queensland) per bunch	...
Mandarins (Queensland, in Melbourne), per case	10s. to 12s.
Oranges (Queensland), per case	10s. to 12s.
Oranges (Queensland) Navel, per case	...
Passion Fruit, per half-case	7s. 6d. to 8s.
Pineapples (choice, Ripleys), per case	7s. to 7s. 6d.
Pineapples (Queens), per case	6s. 6d. to 8s.
Pineapples (common),	6s. 6d. to 7s.
Strawberries (Queensland) per 3-quart tray	4s. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	OCTOBER. Prices.
Apples, Eating (American), per case	10s. to 15s.
Apples, Cooking (American), per case	8s. to 12s.
Bananas (Cavendish), per dozen	$2\frac{3}{4}$d. to 5d.
Bananas (Sugar), per dozen	3d. to 4d.
Cape Gooseberries, per quarter-case	7s. to 8s. 6d.
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per case	...
Lemons (Local), per case	5s. to 7s. 6d.
Limes, per case	5s. to 6s.
Mandarins, per case	3s. 6d. to 8s.
Oranges (Navel), per case	8s. to 9s. 6d.
Oranges (other), per case	4s. to 6s.
Papaw Apples, per quarter-case	1s. to 4s.
Passion Fruit, per quarter-case	5s. 6d. to 8s. 6d.
Peanuts, per lb.	3d.
Pineapples (Ripley), per dozen	1s. to 2s. 6d.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Strawberries, per dozen boxes	3s. to 3s. 6d.
Tomatoes, per half-case	2s. 6d. to 6s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1913.

Animal.	SEPTEMBER. Prices.
Bullocks	£10 to £12 10s.
Cows	£6 15s. to £7 17s. 6d.
Merino Wethers	22s. 6d.
Crossbred Wethers...	28s. 9d.
Shropshire Wethers	21s.
Merino Ewes	19s.
Crossbred Ewes	20s. 3d.
Lambs	20s.

LONDON QUOTATIONS—OCTOBER.

Jute, £34 per ton.

Copra, £31 10s. per ton.

Sisal Hemp: Mexican, £30 to £30 10s. per ton; German East African, £33 10s. to £34 per ton.

Cotton (Uplands), 6½d. per lb.

Rubber (Fine Hard Pará), 3s. 4½d.

Plantation Crepe, 2s. 1½d.

The British Chamber of Commerce, 9, rue des Pyramides, Paris, Official Representative of the Commonwealth of Australia in France, reports:—" Le Commerce" publishes an interesting report made by M. Alfred Durand, an honorary director of the Colonial Department of France, on the rubber trade, from which we take the following extract which should be of interest to Australia:—

From statistics it is found that this trade is making exceptionable progress in Bordeaux, France, and is likely to become very extensive in the near future.

The outlets for the Bordeaux market are similar to Antwerp and Hamburg, and rubber reaches it at the same price. Brokers have adopted the same conditions as in Antwerp—that is, rubber sold, taken in entrepôt within ten days of purchase, payable in fcs., per kilo, discount 2 per cent. cash on delivery.

As regards price, we may quote the following:—1,250 kilos of rubber (2,314·85 lb.) gives a tare of about 270 kilos, and is valued at 8·50 fcs. (5s. 10d.) per kilo, making fcs. 8,330, which after deducting 2 per cent.=fcs. 166·60 (£6 13s. 3d.), freight 60 fcs. (£2 8s.), and other expenses fcs. 155·85 (£6 4s. 8d.), leaves fcs. 7,932·55 (£317 5s.) to pay to shipper.

Bordeaux is well situated for the rubber trade, and at present receives supplies from West Africa, Madagascar, Tonkin, and even America.

In order to facilitate matters, all the rubber brokers in the town have, since 1905, organised themselves into a syndicate, and will, no doubt, by such means, be able to offer better conditions to exporters of rubber.

Farm and Garden Notes for December.

FIELD.—The grain harvest will be now nearing completion, and to all appearance the results are likely to constitute a record, notwithstanding the dry spell of September, and the yield promises to be very satisfactory to the wheat-growers. The principal factor operating against a still greater extension of the wheat-growing industry is, that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

The dry weather which prevailed during parts of the month of September gave rise to grave fears for the harvest, but the subsequent timely rainfall came just in time to save the crop. The estimates of the probable yield have varied so considerably that it will be well to wait until the harvest is over before calculating on the result.

Given favourable weather, maize, panicum, imphee, Kafir corn, and sorghum may be sown. Arrowroot, ginger, and sweeet potatoes may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kind of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite

green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grape once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. DECEMBER, 1913 PART 6.

Agriculture.

NOTES ON POTATO-GROWING.

SPROUTING POTATOES.

Some farmers hold the opinion that seed potatoes may be planted whether sprouted or not without any detriment to an even crop. This was clearly proved to be erroneous by an experiment made a few years ago at the Queensland Agricultural College. The late Principal (Mr. John Mahon) was anxious to get an early summer crop of potatoes. There was plenty of seed, but very little had sprouted; and the farm foreman (Mr. A. Watt) objected to plant any but sprouted potatoes, and, to prove that he was right, a couple of acres were planted with the unsprouted seed, and, later, 4 or 5 acres were planted with potatoes well sprouted. The result was soon apparent. In the first plot the plants only appeared here and there, considerable time elapsed between their appearance, and "misses" were numerous. The plants on the 5-acre plot all appeared simultaneously, and there were scarcely any misses. That settled the question of

DOES IT PAY TO SPROUT?

This is what a writer on the subject (Mr. John Weathers, editor of "Commercial Gardening") says:—

"The object of sprouting the tubers before planting is to induce growth to start from one or two of the best eyes, and thus secure active

growth in every case. If the tubers are well exposed to the light, but protected from frost, the sprouts will be slow of growth and sturdy; in the dark, they would become pale and long, and would be easily broken off, in addition to which the tubers would also shrivel."

[That this is so, we (Ed. "Q.A.J.") had practical proof in a case of kidney potatoes we brought to Queensland from London in a sailing vessel, which was 118 days on the voyage. On opening the case, it was found that the potatoes had sprouted vigorously, and were quite shrivelled, yet when planted, the sprouts, which were allowed to remain on the tubers, made good plants.]

There is little doubt that it pays to sprout. Each tuber is known beforehand to be in a growing and healthy condition; consequently, there is no danger of blank spaces, so often caused by the non-development of some tubers."

The following figures, taken from Leaflet 58 of the Irish Department of Agriculture, quoted by Mr. Weathers, show at a glance the advantage to be gained by planting sprouted "seed" potatoes:—

TABLE SHOWING RESULT OF SPROUTED AND NON-SPROUTED POTATO "SEED."

Year.	Number of Centres.	Average Yield per Statute Acre.		Average Gain Due to Sprouting.
		Sprouted Seed.	Unsprouted Seed	
		Tons cwt.	Tons cwt.	Tons cwt.
1903	12	11 1	9 8	1 13
1904	34	11 6	8 13	2 13
1905	91	12 17	10 16	2 1
1906	67	11 9	9 2	2 7
1907	67	10 6	8 6	2 0
1908	67	13 0	10 15	2 5
1909	50	12 19	10 4	2 15
Average of 338 tests	...	12 0	9 15	2 5

SIZE OF SEED POTATOES.

A good deal has been written on this subject, the main point being to discover whether it is more economical to plant large, small, cut, or medium-sized tubers. After many experiments and some years of experience in potato-growing, we may say that there is little to be said one way or the other if the "seed" is sound and the cultivation good. Sometimes cut tubers will show a slight increase in yield over whole ones, and *vice versâ.* The same holds good with large and small tubers. Indeed, some very fine yields have been obtained from experiments in which only potato peelings and cuttings were used. Generally speaking, however, it will be found economical to plant tubers weighing about 3 oz. each—that is, about the size of a hen's egg. The cost of seed per acre will, of course, depend upon the distance of planting and the current price. The vast majority of growers in Europe use about 1½ tons of seed potatoes to the acre, but they will probably be astonished to find that the results are not in proportion to the cost of seed, labour, manure,

&c., and that better results are to be obtained with a much smaller quantity of seed.

In selecting seed potatoes, experience seems to prove that it is wise to secure *immature* tubers from a different neighbourhood each year. In other words, it is bad business for a man to plant his own home-saved seed potatoes.

DISTANCE BETWEEN THE ROWS.

A moment's consideration will be sufficient to show that close planting results not only in poorer crops, but involves greater initial expense for seed and labour, and is very likely to result in a heavy loss through disease. From experiments carried out by the writer of these notes, it seems to be conclusively proved by the figures given below that the wider planting of both early and late varieties will yield finer and larger crops, fewer "chats,"* and less disease, in addition to which there will be a considerable saving in the purchase of seed and in the necessary labour of cultivation. The following figures show the difference between allowing a fair amount of space for the plants to grow and overcrowding:—

Table Showing Results of Planting Potatoes at Various Distances Apart, Soil Trenched 2½ to 3 ft. Deep. No Manures except Vegetable Refuse.

Variety.	Distance Apart.		Number of Sets per Acre.	Weight of Sets per Acre.			Costs of Sets per Acre, at 3s. per cwt.			Average Yield per Set.	Greatest Number of Tubers per Set.	Lowest Number of Tubers per Set.	Average Number of Tubers per Set.	Average Weight of Tubers.	Gross Yield per Acre in Tons.
	Rows.	Sets.													
	Feet.	Feet.		Cwt.	qr.	lb	£	s.	d.	Lb.				Oz	
I. British Queen ...	3	1½	8,800	11	3	0	1	15	3	$6\frac{3}{10}$	...	...	...	...	$24\frac{8}{10}$
IA. " " ...	2	1	17,920	27	0	16	4	1	5	$2\frac{1}{10}$	...	...	...	...	$17\frac{2}{10}$
II. Early Puritan ...	3	3	4,840	8	0	0	1	4	0	$8\frac{7}{10}$	88	25	45½	3	$18\frac{6}{10}$
IIA. " " ...	2	2	10,240	17	0	0	2	11	0	$4\frac{6}{10}$	53	9	25½	$2\frac{4}{5}$	$20\frac{4}{10}$
III. Duchess of Cornwall	3	3	4,840	8	0	0	1	4	0	$7\frac{7}{10}$	64	18	$34\frac{4}{5}$	$3\frac{5}{10}$	$16\frac{5}{10}$
IIIA. Duchess of Cornwall ...	2	2	10,240	17	0	0	2	11	0	$3\frac{8}{10}$	47	11	$22\frac{4}{5}$	$2\frac{9}{10}$	$17\frac{8}{10}$
IV. Myatt's Ashleaf	3	3	4,840	8	0	0	1	4	0	$4\frac{7}{10}$	53	24	38	2	10
IVA. " "	2	2	10,240	17	0	0	2	11	0	2	53	11	26	$1\frac{1}{5}$	$9\frac{1}{10}$

These experiments are interesting, as they show conspicuously the absurdity of the popular fallacy that one is "wasting ground" by giving potatoes sufficient space to grow:—

In No. I., "British Queen" Experiment, it is obvious that at 3 ft. apart not only did the seed cost £2 6s. 2d. less per acre, but there was a gain of over 7 tons to the acre against the potatoes at 2 ft. apart. This, at £3 per ton, would represent another £21. If there were any truth in the statement that it is "wasting ground" to give so much space, it is obvious that, at 2 ft. by 1 ft. apart, the 17,920 sets should have given at least twice as great a yield (*i.e.*, over 49 tons per acre) as the 8,800 sets. But they actually gave over 7 tons less—representing a great loss. Again, for every set planted at 3 ft. by 1½ ft. apart, the

average yield was well over 6 lb. per set; while at 2 ft. by 1 ft. the average was just over 2 lb. per set.

The "Early Puritan," Experiment II., again shows that there is nothing gained by planting too close together. Although the 17 cwt. of seed produced 20⅗ tons to the acre, the average yield per set from the 2ft.-by-2ft. rows was only 4 6/10 lb., against 8 7/10 lb. from the 3ft.-by-3ft. rows; and the average weight of the individual tubers was greater in the rows farther apart. Another important point in this experiment was that, in the 3ft.-by-3ft. rows, the average number of tubers to each plant was 45½, against 25½ from the 2ft.-by-2ft. rows. There was a larger quantity of "chats" amongst the tubers from the 2ft.-by-2ft. rows, so that the extra yield of 1⅕ tons to the acre was swallowed up by inferior produce, and signs of disease that were absent from the 3ft.-by-3ft. rows.

In Experiment III., with the variety "Duchess of Cornwall," precisely the same result is shown as in the others. The extra yield of 1 3/10 tons in the 2ft.-by-2ft. rows was again spoiled by the number of "chats." The average number of tubers per set in the 3ft-by-3ft. rows was 34⅕, against 22⅗ in the rows 2ft. by 2ft.

In Experiment IV., with the early variety, "Myatt's Ashleaf," it will be noticed that there is a big drop in the yield per acre, and also in the average weight of the tubers in comparison with the mid-season and late varieties. Still, even at 3 ft. apart every way, there was a better result than with the rows and sets 2 ft. apart.

OVERCROWDING AND "CHATS."

From a commercial point of view, it is essential to secure as small a quantity of chats as possible in a potato crop. To secure this desirable result, it is necessary to give sufficient space between the rows and the sets. The following results from a square perch of ground (30¼ square yards) show that fewer small tubers will be produced by planting at 3 ft. apart than by planting at 2 ft. apart:—

V.—"WARE" AND "CHAT" EXPERIMENT—"MYATT'S ASHLEAF."

Distance Every Way.	Large Tubers.	Small Tubers.	Total Number.	Per cent. of Chats.	Per cent. of "Ware."	Total Weight.	Average per Tuber.
						Lb.	Oz.
3ft. apart	822	298	1,120	26·6	73·4	140	2
2ft. apart	897	798	1,695	47·0	53·0	128	1⅕

This experiment, again, is a strong argument in favour of wider planting than usual. Not only is a heavier crop produced at less cost, but the general sample in the 3ft-apart plots will be superior to that from the 2ft.-apart ones.

CUT *VERSUS* WHOLE SETS.

This matter is frequently debated, but so far as actual results go there is very little to choose between good, medium-sized sets (say, about

3 oz. each), and cut sets of large potatoes, as may be seen from the following figures:—

VI.—Experiment: Whole Sets versus Cut Sets—"Myatt's Ashleaf."

Fourteen of Each.	Yield.		Total Number of Tubers.	Total Weight of Tubers.	Average Weight per Tuber.
	Large Tubers.	Small Tubers.			
				Lb.	Oz.
Whole sets	303	340	643	45	1·1
Cut sets	303	235	538	42½	1·2

It will thus be seen that, although there was 2½ lb. more weight from the whole sets than from the cuts, and 643 tubers against 538, the average weight of the whole-set tubers was slightly inferior to that of the cut-set tubers.

EARTHING UP AND SUNSHINE.

Another point in potato culture intimately associated with the distance given between the rows and sets is the question of earthing up, and the direction. In experiments carried out with "Myatt's Early Ashleaf," it was shown that a greater yield, fewer chats, and better samples were obtained from sets planted 3 ft. apart every way than from 2 ft. apart.

To see whether there was any difference between moulding up the rows north and south and rows east and west, another experiment was carried out under identical conditions. The sets were 3 ft. apart every way, the only difference being that in one case the earth was drawn up in ridges running north and south, and in the other east and west, with the following results:—

Earthing up "North and South" versus "East and West."

Ridges Running—	Distance between Rows and Sets.	Large Tubers.	Small Tubers.	Total per Rod.	Weight per Rod.	Total per Acre.
					Lb	Tons.
North and South	3ft. x 3ft.	822	298	1,120	140	10
East and West	3ft. x 3ft.	653	355	1,008	114	8

From this it will be seen that such an operation as earthing up may mean a profit or loss to the grower according to the way it is done. Although the sets were 3 ft. apart every way, the fact that the rows were moulded up east and west, instead of north and south, meant a loss at the rate of 2 tons to the acre, and a worse sample into the bargain.

The reason, of course, is quite plain. By earthing up north and south, the rows are fully exposed on both sides to the sunshine at midday, when the work of assimilating carbonic acid gas from the atmosphere

is going on rapidly to make tissue and tubers. The soil is also warmed on both sides, and, providing it contains sufficient moisture and soluble food, the best results may be anticipated.

By earthing the rows up east and west, however, the grower is distinctly taking money out of his own pocket, as the experiment shows. At midday only one side—the south—of the rows catches the sunshine, while the other side—the north—is in perpetual shade. Not only is this the fact, but all rows after the first one may be said to be more or less deeply shaded on the south side also. Hence, but very little warmth from the sun reaches the soil, and, the genial warmth so essential to growth being lacking, the root action is poor in consequence, and less food is taken up to the leaf cells to be acted upon by light.

[In my book on cotton-growing in Queensland, published by the Department of Agriculture and Stock, I recommended as follows:—" The cotton plant requires all the sun it can get, and, if there is plenty of moisture in the soil, the rows of plants should run north and south to lessen the shade as much as possible; but in very hot countries, where the air is dry and the rainfall small, it is better to draw the rows from east to west, in order to retain as much of the soil moisture as possible by shading it with the plants."—Ed. "Q.A. Journal."]

THE SPREAD OF PRICKLY PEAR.

On this subject, Mr. Ernest A. Ashton, of Woody Camp Farm, Clifton, writes:—

I read with interest the article upon " The Prickly-pear Problem," in your July number, by Ernest A. Smith, who dwells upon the emu as being the most favourable medium for the dissemination of the pear.

The emus, where they exist in common with other birds, are probably, to some extent, responsible for the spread of the pear by carrying the seeds; but I think it is safe to say that in the districts containing more than half the pear in Queensland the emu is seldom, if ever, seen.

To prevent, therefore, as far as possible, the spread of pear in all infested localities, it is necessary to look to other means of dissemination.

Anyone with experience in prickly-pear regions will have no doubt in their minds as to the simplest and most expeditious method of spreading the pear, and that is to allow stock to stray uncontrolled over pear-infested areas.

The soil underneath clumps of pear is invariably cool and moist and very favourable for the growth of any stray roots of grass that manage to retain an existence before being overwhelmed with the pear; and stock, in foraging for these grasses, cattle eating the fruit, small leaves, &c., the clumps get knocked about and the leaves scattered around.

This knocking about acts as a beneficial pruning to the parent pear plant, which shows its appreciation by doubling its size in a few months, whilst each leaf sends out its roots, and sets about becoming a parent plant as soon as possible; and cattle carry the seeds of the fruit they have

eaten to plant them in due course in the performance of their natural functions.

Evidence of this spreading can be seen on privately owned farms adjoining pear lands, whose owners have in the past been accustomed to allowing spare stock to roam over the adjoining open pear land and carry the seeds home to their farms. Instances can be found in such cases where the pear is thicker on these farms now than on the adjoining pear lands; and in many spots adjacent to creeks and waterholes, where cattle are accustomed to camp, the pear will be found to be far thicker and higher than elsewhere.

The prevention of this method of spreading the pear is obvious, and shire councils should be compelled to strictly enforce the law respecting straying stock, the prevention of the spread of the pear being of vital importance to the people of Queensland, all of whom, through their councils and Government, will have to contribute, either directly or indirectly, towards the enormous and ever-increasing amount it will cost to clear this country of pear.

That the laxity of the law in respect to straying stock is of no benefit to individuals is obvious from the fact that it will cost more to clear the pear from many farms, the owners of which have introduced it themselves through the medium of straying stock, than any profits that have been derived from such straying cattle.

COTTON-GROWING IN THE CENTRAL DISTRICT.

By THE EDITOR.

Cotton has been successfully grown for over forty years in most of the Eastern Coastal districts of Queensland, along the whole seaboard, either on a commercial scale or experimentally; whilst inland it has been proved that even larger returns may be got as far as 700 miles from the coast, owing to the suitable conditions of soil, climate, and rainfall. What are these conditions?

Cotton loves a warm atmosphere. Some varieties do best in a warm, dry atmosphere; others prefer a warm, damp climate. Where these conditions exist, the cotton plant will reach its greatest perfection, since the temperatures of the soil and air are practically in accord, and remain equable during the whole growing season. Where are they to be sought?

In this State, they are found, as said, along the whole seaboard; and, as a consequence, where the soil is suitable, the whole of our Coast lands and of our Western lands are adapted to the production of excellent marketable cotton. It should, however, be noted that, whilst our Southern and Central lands furnish a congenial atmosphere for the Uplands varieties, the Sea Island and Caravonica cotton demand moisture in the atmosphere, which is only found, as a rule, in the Northern districts—say, from Mackay northwards. Any long absence of this moisture is injurious to the Sea Island and kindred varieties. The Egyptian and certain Uplands varieties find the most congenial conditions in the

Southern and Central districts, particularly in the latter. With some exceptions, the finest cotton lands and the most suitable climate are found in the country around and far to the westward of Gladstone and Rockhampton—that is, in respect of Uplands cotton. The same may, however, be said of the Bowen and Townsville districts, where the rainfall is not so copious as farther North—at Cairns, Port Douglas, &c. There are thousands of acres in the Central districts—from Westwood to Emerald, Alpha, Barcaldine, and Longreach—where cotton can be and should be grown to the great advantage of farmers. The soil is all that can be desired. What is known erroneously as the desert country around Barcaldine, for instance, is ideal cotton country. There is every facility for transport to port by rail either to Rockhampton, Gladstone, or on to Brisbane from Longreach (426 miles from Rockhampton). These Central lands have produced from 1,200 to 2,000 lb. of seed cotton per acre, which means from 600 lb. to 800 lb. of ginned cotton, worth to-day 7d. per lb. in the Liverpool market or £17 10s. to £23 6s. 3d. per acre gross return. The seed is quoted in the London market at £7 per ton—that is, for Woolly Upland seed, from which several by-products are obtained, such as short lint or linters (*i.e.*, the lint not removed in the first ginning, and which is worth £3 per ton), hulls worth over £2 per ton, oil worth £20 per ton, and oilcake worth £5 per ton. But farmers would sell their cotton to the ginneries in the seed at a fixed price, say, of 2d. per lb. Thus, a 1,500-lb. crop would give them a gross return of £12 10s. per acre, from which must be deducted the cost of preparation of the land (not including clearing), seed, planting, cultivating, picking, and marketing, amounting in all to about £4 10s. per acre, leaving a net profit of £8 per acre. Even with a 1,000-lb. crop, the net profit will be from £5 to £6 per acre. If the farmer keeps his picking in his own family, the cash outlay is reduced by £2 1s. 8d. for a 1,000-lb. crop and by £3 2s. 6d. for a 1,500-lb. crop per acre.

As showing that such returns can be obtained, a farmer at Vernor, a few miles from Ipswich (Mr. C. Litzow), harvested 3,006 lb. from 2 acres, and, considering the ideal soil and climate of large tracts of the Central districts, this return should be almost an average, especially with Russell's Big Boll. We have always advocated, from personal knowledge of the Central districts, the growing of cotton by farmers as an adjunct to other farming operations. There is not half the labour connected with growing and marketing 10 acres of cotton that there is in growing the same area of maize or potatoes, for once the young plants have covered the ground—*i.e.*, once the rows are overshadowed by the foliage—no further labour is needed; whilst as for rainfall, very little is needed, except when the plants are very young, and again just before the bolls begin to form. We have been personally engaged in cotton growing, ginning, shipping, &c., for several years; therefore, what has here been written is the result of practical experience; and we strongly advise farmers to take advantage of the assistance now offered by the Department of Agriculture and Stock in providing seed, making a preliminary advance of 1½d. per lb. on all cotton produced, and making a further payment of all profit obtained in the home market after paying bare expenses.

RHODES GRASS: ITS SUITABILITY FOR FOREST LAND.

By S. B. BROOKS, Instructor in Agriculture.

Rhodes grass is now so well known in this State and its value as a pasture grass so well recognised that it may seem rather superfluous to again bring it under the notice of the readers of this journal.

This grass has so far been looked upon by most farmers as essentially suitable for scrub lands only, and the question of converting areas of virgin forest into Rhodes-grass paddocks has scarcely been considered.

In my travels throughout the various agricultural portions of the State, information has been secured from time to time on this most important question, and from the data collected I feel certain that the time is near at hand when the work of putting large areas of forest country under Rhodes grass will be in active operation.

I have met with a few isolated cases of farmers at work on forest lands, who, seeing the great value of this grass on scrub soils, have laid down small patches verying in size from 1 acre to 5 acres. They have found very little difficulty in establishing this grass, exceptions being where the seed has been covered too deeply or put in at the wrong season of the year.

The results obtained from these experimental patches, although demonstrating that it is a comparatively easy matter to establish this grass on forest lands, are, nevertheless, of little value in showing its carrying capacity compared with the original "native" varieties.

In the near future more accurate data will be forthcoming on this point. Operations are now being conducted on a more extensive scale in several localities. For instance, at Taabinga, Mr. A. Yungman has recently planted over 600 acres, and an additional area equal in size is under preparation. A Kingaroy farmer (Mr. Salum) is now at work putting in 150 acres; while another gentleman, in the Gin Gin district, has advised that he is arranging to lay down 100 acres as a preliminary test.

In the first paddock laid down by Mr. Yungman a splendid "strike" was secured. Although this has not yet had the benefit of summer rains, the grass is sufficiently established to allow of the paddock being stocked with cattle. I predict that, given an ordinary season, an inspection of this field during the month of March would be an eye-opener to those interested in this subject.

As already mentioned, the carrying capacity of Rhodes compared with the average forest pasture has not, so far as I am aware, been actually estimated. From information obtained, the general opinion is that on land that would fatten a bullock to 10 acres it would, if under Rhodes, be improved to such an extent that it would fatten a beast to 3 acres.

The cost of putting vine scrub land under Rhodes is approximately the same in various districts, but in forest country it would vary considerably according to whether the land was heavily timbered, and also to the texture of the soil—whether heavy or light.

An approximate estimate of laying down forest land under Rhodes would be as follows:—

	Per Acre. £ s. d.
Ploughing 2 to 3 inches deep	0 10 0
Sowing	0 1 0
Seed, at 10d. per lb.	0 1 8
Rolling	0 1 0
	£0 13 8
In timbered country, burning off dead material	0 10 0
	£1 3 8

By using a 3 to 5 furrow plough and working large paddocks, the farmer could no doubt reduce the expense of breaking up to less than that stated.

PREPARATION OF LAND FOR PLANTING.

In putting forest country under Rhodes, the best results will invariably be obtained if the timber has been previously rung. In any case, all dead branches should be gathered up, and any trees growing so close together as to prevent teams working freely removed.

In scrub lands the ash resulting from burning off is quite sufficient for a seed bed. Numerous attempts have been made to establish this grass in forest areas simply by sowing the seed among the native grasses. The result, in nearly every instance, has been complete failure, only a few isolated plants showing up. The Rhodes grass is certainly a very aggressive one; still, it cannot be expected that the tender seedlings could rest upon the hard surface and hold their own with the old-established grasses. Not only should the surface of the land be stirred up to form a bed for the propagation of the young plants, but the growth of the existing grasses should be checked at least sufficiently to give the Rhodes a good start.

The spring-tooth cultivator has been used on soils of a sandy or friable nature with fair results.

It will be found necessary to first burn off the existing grasses and go over the land twice with the cultivator, the second cultivation being carried out diagonal to the first.

On areas where the land is comparatively level and not too thickly timbered the one-way disc cultivator is an improvement on the spring tooth, in that it destroys the roots of the indigenous grasses.

The most satisfactory method of preparation, and one that is applicable to all conditions of soil, is by ploughing. Deep cultivation is unnecessary; all that is required is to skim the surface just sufficiently to cut the roots of grass and other plants. Turning over every alternate yard has been suggested, but this method, unless the pasture is a very good one, is not recommended, as half the seed is practically wasted as well as half the time taken in rolling.

As to whether the disc or mould-board plough should be used depends upon circumstances. Given a rough surface with numerous roots

and hidden stumps, the disc will invariably perform the best work; but should the land be fairly level, and only moderately infested with roots, the mould-board is preferable, owing to the larger area that can be turned over in a day. With the disc, ploughing at a shallow depth, a furrow of only some 6 in. in width can be cut; and should a wider furrow be attempted, a " rib " will be left untouched. On the other hand, a mould-board fitted with a wide share can be set to cut from 9 to 12 in. In either case—disc or mould-board—if roots are present, a stump-jump must be used.

In dealing with large areas a plough turning less than 3 furrows is not recommended. Should extensive operations be contemplated, more especially on open grazing country, the use of a motor tractor outfit would be worthy of consideration.

A motor tractor has now been in use at the Gatton Agricultural College for some time for ploughing and cultivating, with very satisfactory results. By its use not only can large areas be ploughed in a day (10 to 15 acres) but the cost per acre is reduced very considerably compared with the work done by horse teams. From information supplied, it appears that the total expenditure on fuel (oil), labour, interest on outlay, &c., only amounts to about 3s. per acre.

PLANTING.

As a rule, there is no necessity to harrow the land previous to planting, and on no account should the seed be sown on rough land and covered by harrowing. The seed is generally sown by hand, and by mixing with sawdust a better and more even distribution is effected. The Cahoon seed-sower (hand) is sometimes used. The seed being light, there is some difficulty in getting it to pass through the machine; but this may be, to a large extent, overcome by using a short rod for feeding purposes.

It is important that planting should be immediately followed up by rolling. The land being in a somewhat rough state, an iron cylinder roller will be found to give best results, as it will require less by way of horseflesh than one of smaller dimensions.

TIME TO PLANT.

This point has been dealt with in a previous issue, but for the benefit of recent subscribers a few hints may be useful.

The time to plant depends, to some extent, upon locality. In districts where heavy frosts are common, it is essential that the young plants be well established by the time these are experienced. By sowing from October to end of January, all danger in this respect will be eliminated. Instances are on record where sowings have been successfully made two months earlier and also later, but by doing so more risk is attached to the securing of a good stand.

AMOUNT OF SEED REQUIRED.

Two pounds of seed is the recognised quantity for an acre. Large areas of scrub lands have been successfully put under this grass at less than 1 lb. per acre. This is when the farmer has saved his own seed.

The quality of the seed on the market is so variable that it is wise, unless tested, not to take any risks. Rhodes seed is now so cheap and plentiful that, should any doubt exist as to quality, the putting in of an extra pound per acre would be money well spent.

THE POSSIBILITIES OF RHODES ON FOREST LANDS.

The planting of our scrub lands with Rhodes grass has undoubtedly been of vast benefit to the State. If it were possible (which I believe it will be) to substitute this grass for the inferior indigenous varieties to be found on many of our forest lands along the coast, and thereby doubling its carrying capacity, the value that would accrue to the State would be inestimable.

It is a well-recognised fact that many of the best pasture grasses have disappeared from the Darling Downs country. Although the heavy class of soil to be met with in this district would be of the most refractory type upon which to establish this grass, nevertheless, I feel sure that by the carrying out of a few experiments, such as the use of a cover crop, success could be attained.

Rhodes has already proved to be one of the best grasses for cattle, either for fattening or for milk production.

Mr. W. G. Brown, Instructor in Sheep and Wool, has kindly promised to deal with its possibilities as a sheep pasture in a future issue of this journal.

REMEDY FOR FOUL BROOD OF BEES.

In reply to a correspondent on this subject, Mr. Hindes, Bee Expert at the Agricultural College, says:—

As Mr. McEvoy, Inspector of Apiaries for the Province of Ontario, appears to have been most successful in treating this disease, I herewith give his method of treatment. In the season, when the bees are gathering honey freely, remove the combs in the evening and shake the bees into their own hives. Give them frames with comb-foundation starters, and let them build comb for four days. The bees will make the starters into comb during the four days, and store the diseased honey in them which they took from the old comb. Then, in the evening of the fourth day, take out the new comb, and give them comb-foundation (full sheets) to work out, and then the cure will be complete. By this method of treatment all the tainted honey is removed from the bees before the full sheets of foundation are worked out. All the old foul-brood combs must be burnt, or carefully made into wax after they are removed from the hives, and all the new combs made out of starters during the four days must be treated in the same manner on account of the diseased honey that may be stored in them. All the curing and treatment of the colonies must be done in the evening, so as not to have any robbing or cause any of the bees from the diseased colonies to mix and go with the healthy ones. By doing all the work in the evening, it gives the bees a chance to settle down nicely before morning, and there is then no trouble or confusion.

Pastoral.

MAGGOTS IN RAMS' HEADS.

By W. G. BROWN, Sheep and Wool Expert, Department of Agriculture and Stock.

A very serious trouble in the Merino flock is the constant recurrence of maggots in rams' heads.

This infliction was present long before the advent of the sheep maggot fly as we know it to-day, and has bothered very many flockmasters with the feeling that his males may not be in condition to go amongst the ewes with a prospect of a successful lambing.

There is, first, the annoyance to the animal caused by the presence of the maggots, and then the knocking about which frequent mustering and yarding entails. Consequently, if something can be found which will keep the maggots out of rams' heads, one very serious cause of trouble to the flockmaster will be eliminated.

This is a record of an experience met with on Messrs. McNeill Brothers' station, Marmadillo, in the Springsure district, in October of this year:—

While visiting that district investigating the maggot-fly trouble, Messrs. A. H. Cory (Chief Government Veterinary Surgeon), Mr. J. Jarvis (Assistant Government Entomologist), and I met Mr. McNeill, and he invited us out to his place to inspect his rams. He informed us that up till a month before our visit he had been forced to muster his rams (125) weekly, and, as a rule, found from 9 to 14 with maggoty heads every time, although the heads had been dressed regularly. Then he heard that bluestone was a good dressing against the attacks of the fly, and he tried it, with the result that on the day of our visit his sheep had not been treated at all for four weeks.

On inspection only one ram was found blown, and that in a splinter half-way down the first spiral, the splinter being caused, apparently, by fighting. All the rest of the flock were perfectly free from maggots in the head, and, what was very noticeable, there was an absence of the blue flies which are usually found buzzing about any flock in these days when the sheep are yarded.

There was close inspection of every animal.

The chief drawback was that the wool was stained blue, and several samples I scoured (and scoured bone dry) left the blue tinge still on the wool. This, in the case of rams, is only a trifle; for the chief thing, excepting in show sheep, is to keep the rams in good condition for their season's work.

Mr. McNeill uses a somewhat strong solution of bluestone as a dressing—2 lb. bluestone to 3 gallons of water, and applied to the wool without shearing the heads. A liberal swabbing is given, and the liquid is poured behind the horns.

Messrs. McNeill are quite satisfied that they have now a good defence against the fly blowing their rams' heads, and what we saw there, compared with elsewhere, seems to warrant them in believing so.

In any case, the method is well worth a trial by those who find that almost every other dressing fails to keep the maggots from rams' heads.

THE SHEEP BOT FLY.

A WARNING TO PASTORALISTS.

By W. G. BROWN, Sheep and Wool Expert.

Last year Mr. Searle, a butcher at Westbrook, Darling Downs, forwarded to the Department the pupa of an insect obtained by him from the nostrils of a lamb's head, which he had chopped open. The insect was identified by Mr. Tryon as the pupa of the Sheep Bot Fly. (*Œstrus ovis*).

I happened to be in the Westbrook district at the time, and I called on Mr. Searle, and learned from him that the animal had been bred in the district. I called on the owner, and learned that no signs of the fly had been seen in the rest of the flock. Recently two cases have been reported from widely different districts, on the Darling Downs, to Mr. A. H. Cory, Government Veterinary Surgeon, and the pupæ were sent in for identification. Mr. Jarvis (Assistant Government Entomologist) identified these pupæ as the *Œstrus ovis*.

This is published to ask sheep farmers to be on the lookout for the insect, the life history of which is given as follows in the "Farmers' Encyclopædia of Agriculture," page 457:—

"The sheep bot fly resembles the common house fly, but is much larger. It is covered with small round spots. The abdomen bears velvety-brown and straw-coloured hairs. The maggots are of a white colour with brown spots on the anterior segment. The eggs are deposited within the nostrils of the sheep. After hatching, the larvæ penetrate deeply into the nasal cavity, and after becoming full grown they fall to the ground and pupate and finally emerge as full-grown flies. The maggots may be dislodged with a feather dipped in turps and inserted into the nostrils of the sheep.

"Tar or whale oil smeared on the nostrils of the sheep will tend to keep the fly away."

The signs that the fly is active are—restlessness, stamping, and the holding of their heads against other sheep or in the dust. The time of attack of the fly seems to be about March or April, in Queensland.

I am giving these particulars as early as I can, in order that the inroads of another pest shall be checked as soon as possible. If sheep farmers generally will see that the heads of slaughtered sheep are chopped in halves along the nasal passages, and if the insect be found immediate report be made to the Department it will help to locate the fly.

In New Zealand, I am informed by a practical man, this fly causes a good deal of trouble, and I take this opportunity of warning sheep farmers that there is reason to believe that we have the fly on the Darling Downs, in small and isolated cases as yet, it is true; but the maggot fly came in the same way. Therefore, keep your eyes open.

[In connection with the above, we may quote a paragraph from an "Extract of a Report of the Entomologist, Department of Agriculture, to the Minister for Mines and Agriculture, Sydney, dated 30th June, 1905, on the Blow Fly and the Sheep Bot Fly." In June, 1910, a report of the Stock Branch, Department of Agriculture, Sydney, stated that as long ago as 1904 Mr. Froggatt, the Government Entomologist, pointed out the serious pest which the blow fly might become if no steps were taken to limit its prevalence. (See "Agricultural Gazette of New South Wales," October, 1910.) This equally applies to the nasal bot fly. The paragraph alluded to reads as follows:—

"The Nasal Sheep Fly (*Œstrus ovis*), an introduced pest known in Europe and other countries, is another serious sheep pest that was reported to be killing sheep, chiefly in the Blue Mountains, at Megalong and Lithgow. I visited Megalong and Gaylong in November, and examined a number of sheep, but could find no outward signs of the fly, though several sheep that had been killed previously had been found to have maggots in the cavities of the nose. This parasite is probably much more common in flocks than is suspected, but as sheep's heads are so seldom used in the country they are not observed, and sheep may often die from nasal fly without the cause being known."—Ed. "Q.A.J."]

OF INTEREST TO ORANGE-GROWERS.

CITRUS CULTIVATION IN ITALY.

Useful data on the cultivation of citrus fruit in the Province of Salerno are presented in the "Monthly Bulletin of Agricultural Intelligence and Plant Diseases" (May, 1913). It is stated in this that in the Nocera district the best citrus fruit groves are let at rents reaching to £32 per acre. Oranges and tangerines are cultivated most; they are planted in alternate rows at the rate of about 240 trees per acre, and they are often interplanted with walnuts (32 to 40 per acre). The varieties of orange which incur the greatest favour are the flattened orange (*Citrus aurantium depressum, Risso*), the pear-shaped orange (*C. aurantium ellipticum,* Risso), the Maltese, and the blood orange. New York and England constitute the chief markets for lemons; two-thirds of the oranges and tangerines produced are consumed in Italy; the rest are sent chiefly to Austria-Hungary. The price of tangerines ranges from 6s. to 12s. per cwt.; that of oranges from 2s. 10d. to 4s. per cwt., during December to March, and from 7s. 3d. or 8s. to 12s. and 16s. per cwt. in the summer. The Nocera harvest lasts from December to August.—"Agricultural News, Barbados."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF OCTOBER, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Lock...	Ayrshire	31 Aug., 1913	1,044	4·0	46·65	
Miss Bell ...	Jersey	25 Sept. ,,	720	5·4	44·06	
Auntie ...	Ayrshire	15 July ,,	761	4·7	40·27	
Butter ...	Shorthorn... ...	27 Sept. ,,	958	3·4	36·06	
Bluebelle ...	Jersey	13 July ,,	630	5·0	35·57	
Honeycomb e	Shorthorn... ...	7 June ,,	627	4·5	31·71	
Bee	Jersey	7 July ,,	581	4·8	31·42	
Silver Nell ...	Shorthorn... ...	26 Sept. ,,	820	3·2	28·39	
Nellie II. ...	,, ...	5 June ,,	714	3·6	28·56	
Miss Edition	Jersey	19 July ,,	603	4·2	28·37	
Lennie ...	Ayrshire	1 Sept. ,,	685	3·5	26·58	
Burton's Lady	Shorthorn... ...	23 June ,,	647	3·5	25·11	
Miss Melba	Holstein	22 Jan. ,,	498	4·4	24·59	
Lady Margaret	Ayrshire	26 Mar. ,,	522	4·2	24·55	
Cocoatina ...	Jersey	19 May ,,	485	4·5	24·52	
Sweet Meadows	,, ...	20 Aug. ,,	357	6·0	24·36	
Gem... ...	Shorthorn... ...	8 Aug. ,,	601	3·5	23·32	
Daisy ...	Holstein	14 Feb. ,,	639	3·2	22·53	
Pauline ...	Shorthorn	8 Oct. ,,	594	3·4	22·35	
Gretchen ...	Holstein	19 June ,,	602	3·2	21·24	
Countess of Brunswick	Shorthorn... ...	22 July ,,	623	3·0	20·80	

Ration fed to cows during October—40 lb. sorghum and cowpea ensilage per day.

FEEDING PIGS ON LUCERNE CHAFF AT WARREN STATE FARM.

By THOS. JONES, Manager.

It is not usual to feed pigs on hay and chaff; but when one has a quantity of good lucerne hay on hand, and Nature does not provide green grass or even a green picking of any description, one cannot do better than to feed his pigs on lucerne hay or chaff.

If the hay be fed to pigs, it can be given in cheaply constructed racks of a convenient height, so that the pigs can reach it easily. I have found it more convenient and economical to cut the hay into chaff fairly short. Then place the chaff in a vessel such as a cask, tank, or the ordinary cast-iron boiler generally used for boiling pig-feed.

The method adopted at this farm is to place a bag of chaff in the receptacle, and mix into it 20 lb. of maize meal. It is then covered with water and left to soak overnight, and fed to the pigs the following day.

The mixture practically means, 70 lb. of chaff to 20 lb. of meal. The pigs eat it readily and leave no chaff in the trough, and their condition is all that could be desired.

Owing to the extremely dry weather experienced during the last few months and the almost total absence of green fodder, pig feed of the ordinary kind has been scarce, but our pigs have not suffered any inconvenience. One sow has just farrowed (first litter). She had eight young ones, all of which were in fine form at the time of birth. The sow recovered after farrowing without any of the ill-effects usually caused by droughty conditions, and yields plenty of milk for the young ones.

The other sows are due to farrow shortly, and are in the pink of condition.

I have no hesitation in recommending lucerne for pigs, either as pasture, hay, or chaff; the latter being the most economical in a drought such as we are going through at the present time.

Lucerne for pigs should be cut a little earlier than when cut for ordinary hay, so as to have the whole plant in a soft condition.

Do not graze pigs on lucerne in wet weather, but keep such a crop and cure it for a "dry day."

Keep pigs off the growing lucerne in drought time, because they have strong snouts and will root down and destroy the crowns. This, of course, could be avoided by ringing the nose, but even then they would give the crop an unmerciful and unnecessary trampling.

THE LABOUR DIFFICULTY IN MILKING.

A NEW METHOD OF DEALING WITH IT.

One of the problems on a dairy farm is to obtain efficient milkers and to utilise their labour profitably between two milking periods. The Walker-Gordon Farms, of New Jersey, have solved this problem. It has always been supposed that it is impossible for a person to milk more than 15 to 20 cows twice daily. During the past year each milker on this farm has been milking from 30 to 35 cows twice a day. The milkers on this farm requested of the management, some time before the system was put into effect, that they be allowed to make a trial, stating that they preferred to spend the whole time milking, rather than to alternate this with the more dirty work on the farm.

The milkers are given to understand that they hold a scientific position, and are well paid. The herd consists of about 700 head, in charge of a general herdsman, of which 330 to 350 are being milked by 11 men. These milkers begin at 2 o'clock a.m., working 5 hours with no intermission, then have 7 hours off, beginning again at the same schedule at 2 o'clock p.m. The average to milk a cow is from 6½ to 7 minutes, and spend from 1½ to 2 minutes in taking the milk to the weigher and washing their hands.

The management of this farm is gratified at the results of this year's trial, and the men are contented with the arrangement.—"Werribee Shire Banner," Victoria.

State Farms.

WHEAT HARVEST AT GINDIE STATE FARM.

Writing on 12th November, Mr. R. Jarrott, Manager of Gindie State Farm, reports as follows:—

We had favourable weather for sowing the early wheat crop just harvested. The portions of land that were summer-fallowed and well-worked yielded an exceptionally good cutting of hay, and would have yielded good grain had it been allowed to mature. There was a marked falling off in the quantity of hay per acre on some of the plots which had not been worked early, and I would strongly advise anyone contemplating wheat-growing in this neighbourhood to get the land ploughed as early as possible and allow it to lie in a rough state until a few good showers have fallen. By that time the weeds will have made a start, and it will be necessary to work the surface lightly to destroy them. The light working will also keep the moisture in the soil. When the weeds are small there is no better implement for this purpose than a good harrow. One block of 22 acres, that had been well worked, retained suficient moisture to germinate the seed. The varieties on this area were Yandilla King, C.B. 60, and Warden's Hay Wheat. This was up when the rain fell in June. The Yandilla King was ready for cutting first, followed by C.B. 60, with Warden's Hay Wheat 8 days later. All these varieties gave an excellent return of hay. A Victorian farmer paid us a visit while we were harvesting, and appeared much surprised when I informed him that the crop had practically matured without rain. The only rain that fell was 38 points in September, and at this date a good portion of the crops were cut. The 60-day Oats did very well considering the season.

A number of new selectors in the district planted small areas of wheat this season, and I understand they were all satisfied with the result.

We are breaking up some new land with the object of giving the old cultivation paddock a year's spell and a good working.

WHEAT EXPERIMENTS—ROMA STATE FARM.

MANURNIG TESTS, 1913 (4th YEAR).

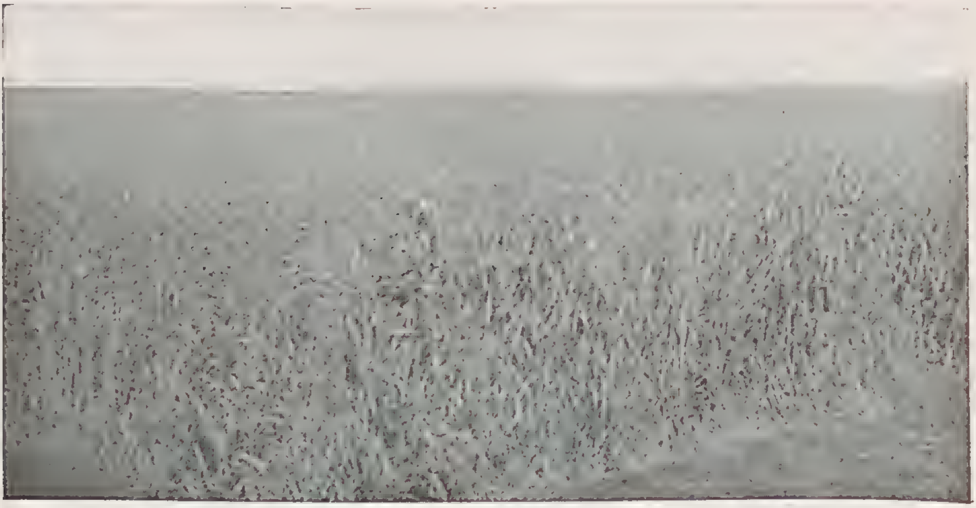
Prior to giving the results of these experiments, a short *résumé* of the season, which, at the commencement, was of great promise, but which towards the close exercised a depreciating influence more or less on th yields, will be given.

Though a certain amount of difficulty was experienced in obtaining the desired condition of the seed bed, the season, as before stated, opened up splendidly, sufficient rain having fallen on early-worked areas to

1. STANDING CROP OF WHEAT, C.B. 60, GINDIE STATE FARM.

2. CUTTING, C.B. 60, GINDIE SEATE FARM.

PLATE 144.—3. WHEAT IN STOOKS AT GINDIE STATE FARM.



4. STANDING CROP OF WHEAT, YANDILLA KING, GINDIE STATE FARM.

5. CUTTING YANDILLA KING, GINDIE STATE FARM.

PLATE 145.—6. STACKING A PART OF THE CROP, GINDIE STATE FARM.

carry the wheat crop along for a good period after germination was secured. A splendid germination was obtained, 3.69 in. of rain falling during the month of May. This was followed in June by 2.75 in., which quantity, with that already experienced, was sufficient to meet the requirements of the wheat crop (so it was considered at the time), which was fortunate, as during the ensuing fifteen weeks rain was registered on nine occasions for a total of 1.16 in. only, the heaviest fall, 0.45 in., being experienced a little over a week before the crops were ready to harvest; and, therefore, of no material benefit to them. Up to the beginning of the second week in August the season was very mild, in consequence of which the crops were in a forward and rather sappy condition. The weather underwent a sudden change, and very heavy frosts were experienced, which occasioned a great deal of damage. Warm weather again set in, but in the first week of September another frost was experienced, which again affected the yields in some instances. Notwithstanding the adverse conditions, the ultimate yields were satisfactory, both from a business and experimental standpoint in most instances.

Preparation of Seed Bed.—The operations in connection with this—which comprised two ploughings, one cultivating, and two harrowings—were delayed owing to the completion of harvesting operations for 1912 not taking place until 10th December, which resulted in a good deal of back work collecting. The turning over of the stubble was accomplished during the third week in January, the ground being then permitted to lie in the rough for the reception of general rains usually experienced during February and March. The second ploughing was done during the second week in March, the ground this time being harrowed over each day. In the latter part of April, weeds having made their appearance, and the surface having become baked, it was found necessary to cultivate, which was carried out with the one-way cultivator and harrowed.

Blocks.—Sown, 1st and 17th May; rate, ¾ bushel per acre; ploughed, 4 in. to 6 in. deep; ripe, 2nd and 3rd week, October.

Approximate cost of production per acre, without manures and bags:—

	£	s.	d.
Ploughing, 2 times, at 5s. 9d.	0	11	6
Harrow, 4 times, at 9d.	0	3	0
Cultivation, 1 time, at 3s. 2d.	0	3	2
Seed, ¾ bushel, at 5s.	0	3	9
Sowing	0	1	9
Harvesting	0	3	4½
Wear and tear, oil, &c.	0	0	9
	£1	7	3½

In the above calculation a man's wages are taken as 6s. 6d. and cost of each horse as 2s. 6d. per day; results being as follows:—

No. of Block.	Manure Applied.	Cost.	Yield per Acre.	Average, Four Years.	Remarks—1913.
			Bushels.		
1	Shirley's No. 1 cereal manure, 1 cwt.	11s.	25·6	22·5	Crop thin; medium height; good heads; fairly well filled; frosted in places. Sown, 17th May
2	Shirley's No. 1 cereal manure, 1 cwt.	11s.	26·9	24·2	Crop similar to No. 1; frosted patches not quite so large
	½-cwt. nitrate lime (top dressing)	6s. 9d.			
3	Shirley's No. 1 cereal manure, ½-cwt.	5s. 6d.	27·6	21·8	Crop similar to 1 and 2; not frosted quite so much; grain, good quality
	½-cwt. nitrate of lime (top dressing)	6s. 9d.			
4	Unmanured	...	21·4	19·4	Uneven; frosted where short straw from 2 ft. 6 in. to 3 ft. 6 in.
5	1 cwt. superphosphate	7s.	24·1	23·1	Even crop; height, 3 ft. 6 in.; fair amount flag; frosted on claypans and where rank in growth
6	Thomas' phosphate, 1 cwt.	5s. 6d.	23·2	20·4	Not so even a crop as No. 5; frosted badly on west end, where crop was inclined to be flaggy
7	Stable manure, 15 tons	£2 5s.	21·2	21·3	This crop, in appearance, was the most promising ever grown here up to the beginning of August. The frost and dry spell both influenced the yield. The excessive growth made not only utilised all the moisture but sheltered the ground to such an extent as to prevent sun's rays reaching it, consequently, the frost was more severe on crop owing to absence of heat in soil where experienced
	½-cwt. superphosphate	3s. 6d.			
8	Superphosphate, 1 cwt.	7s.	22·06	20·3	Crop fairly even; flaggy in places; height, 3 ft. 9 in.; frost west end
	½-cwt. nitrate of lime	6s. 9d.			
9	Nitrate of lime, ½ cwt.	6s. 9d.	18·2	17·6	Soil uneven, resulting in uneven crop; frosted on claypans and where rank; height, 2 ft. 6 in. to 3 ft. 6 in. This block, three years out of four, has given negative results
	Sulphate of potash, ½-cwt.	8s.			
	Superphosphate, 1 cwt.	7s.			
10	Dried blood, ½-cwt.	4s. 6d.	21·6	20·2	Same remarks as applies to 9. At west end of block the soil is of a nice sandy, loamy nature
	1 cwt. superphosphate	7s.			
	Sulphate of potash, ½-cwt.	8s.			
11	Control, unmanured	...	22·0	19·1	This block was the most uneven on the farm. On the claypans the crop was very thin, and only attained a height of 14 in. On the good soil—of which there is at least twice the area found in 10—height was 4 ft.
12	Dried blood, ½-cwt.	4s. 6d.	23·6	21·6	Soil uneven; crop uneven in consequence. Height, 2 ft. 3 in. to 4 ft. More good soil than in 11
	Thomas' phosphate, 1 cwt.	5s. 6d.			
	Sulphate of potash	8s.			
13	Dried blood, ½-cwt.	4s. 6d.	23·6	21·4	Remarks as applied to 12. Larger area good soil at west end
	Sulphate of potash, ½-cwt.	8s.			
	Superphosphate, 1 cwt.	7s.			
	Nitrate of lime, ½-cwt (top dressing)	6s. 9d.			

Block.	Cost of Production.	£ s. d.	Return per Acre.	£ s. d.	Profit per Acre. £ s. d.
1	Tillage	1 7 3½	25·6 bush. at 3s. 9d. =	4 16 0	2 3 10¾
	Bags at 7s. 6d.	0 5 3¾			
	Manure	0 11 0			
	Transport	0 8 6			
		£2 12 1¼			
2	Tillage	1 7 3½	26·9 bush. at 3s. 9d. =	5 0 10½	2 0 0½
	Manure	0 17 9			
	Top dressing	0 1 2			
	Bags at 7s. 6d.	0 5 7½			
	Transport	0 9 0			
		£3 0 10			
3	Tillage	1 7 3½	27·6 bush. at 3s. 9d. =	5 3 6	2 7 10
	Manure	0 12 3			
	Top dressing	0 1 2			
	Bags at 7s. 6d.	0 5 9			
	Transport	0 9 2½			
		£2 15 8			
4	Tillage	1 7 3½	21·4 bush. at 3s. 9d. =	4 0 3	2 1 6
	Manure (nil)	..			
	Bags	0 4 5½			
	Transport	0 7 0			
		£1 18 9			
5	Tillage	1 7 3½	24·1 bush. at 3s. 9d. =	4 10 4½	2 3 1
	Manure	0 7 0			
	Bags, 8 at 7½d.	0 5 0			
	Transport	0 8 0			
		£2 7 3½			
6	Tillage	1 7 3½	23·2 bush. at 3s. 9d. =	4 7 0	2 1 10¾
	Manure	0 5 6			
	Bags, 7 at 7½d.	0 4 9¾			
	Transport	0 7 6			
		£2 5 1¼			
7	Tillage	1 7 3½	21·2 bush. at 3s. 9d. =	3 19 3	0 7 11
	Manure	2 8 6			
	Bags, 7 at 7½d.	0 4 4½			
	Transport	0 7 0			
		£4 7 2			
8	Tillage	1 7 3½	22·0 bush. at 3s. 9d. =	4 2 6	1 10 3½
	Manure	0 13 9			
	Bags	0 4 7			
	Transport	0 7 4			
		£2 12 2½			
9	Tillage	1 7 3½	18·2 bush. at 3s. 9d. =	3 18 3	0 19 5½
	Manure	1 1 9			
	Bags	0 3 9			
	Transport	0 6 0			
		£2 18 9½			
10	Tillage	1 7 3½	21·6 bush. at 3s. 9d. =	4 1 0	1 2 9½
	Manure	0 19 6			
	Bags	0 4 6			
	Transport	0 7 0			
		£2 18 3½			

Block.	Cost of Production.	£ s. d.	Return per Acre.	£ s. d.	Profit per Acre. £ s. d.
11	Tillage	1 7 3½	22·0 bush. at 3s. 9d. =	4 2 6	2 3 3½
	Manure (nil)	...			
	Bags	0 4 7			
	Transport	0 7 4			
		£1 19 2½			
12	Tillage	1 7 3½	23·6 bush. at 3s. 9d. =	4 8 6	1 10 3½
	Manure	0 18 0			
	Bags	0 4 11			
	Transport	0 8 0			
		£2 18 2½			
13	Tillage	1 7 3½	23·6 bush. at 3s. 9d. =	4 8 6	1 0 10½
	Manure	1 6 3			
	Top dressing	0 1 2			
	Bags	0 4 11			
	Transport	0 8 0			
		£3 7 7½			

With one exception, these results show that labour can be employed for wheat production and be a payable transaction.

The results financially are not large to all appearance, but when the time devoted to obtaining them is taken into consideration, it will be found much more remunerative, probably, than occupations taken up in its stead. To instance this, the return from Block 3 will be taken. Upon calculation it is found that, of the £2 7s. 10d., £1 10s. 10½d. is the profit for one day's work, each acre having absorbed 1.54 approximate day's work throughout the season; whilst, if the farmer accomplishes the work himself, it is found that each acre returns him the following amount for his exertions (approximately):—

	£ s. d.
Labour, 1.54 days, at 6s. 6d.	0 10 0
Profit	2 7 10
	£2 17 10

And under the same conditions he will receive per day—

	£ s. d.
Labour, 1 day at 6s. 6d.	0 6 6
Profit, per day's work	1 10 10½ (approx.)
	£1 17 4½

The block showing a profit of only 19s. 5½d. works out as follows:—

	£ s. d.
Return per acre—1.54 days, at 6s. 6d. (labour) ..	0 10 0
Profit	0 19 5½
	£1 9 5½
Return per day's work—	£ s. d.
Labour, 1 day at 6s. 6d.	0 6 6
Profit, on day's work	0 12 7½
	£0 10 1½

Of course, such returns are governed by conditions. In some seasons less working may be required, and in others more.

STATE FARM, BUNGEWORGORAI.

MANAGER'S REPORT—14TH NOVEMBER.

Weather Conditions.—As is usually the case, ideal weather has been experienced for harvesting operations, but such conditions retard operations in connection with the production of summer crops. More especially has this been the case this season, for during the last five months only 3 in. of rain has been experienced. Of this quantity 1.84 fell during the latter part of October; it was of no benefit to the winter cereal crop, and of very little otherwise, owing to the extreme dryness of the soil on unfallowed areas.

The following are the meteorological readings for the month ending 14th November:—

	Highest.	Lowest.	Average.
Humidity	88°	21°	39.5
Maximum	100°	75°	86.8
Minimum	73°	39°	56.1
Rainfall	1.35 in., representing 4 wet days.		

Land under Crop: Permanent: Vineyard, 7 Acres.—With the exception of some of the shy-bearing kinds a very heavy crop of fruit is promised by both wine and table varieties.

The weather conditions have been wholly against the propagation of black spot and other fungoid diseases; consequently all the vines are in an extremely healthy condition.

Orchard: Citrus Fruits.—A few cases of the new crop of lemons, which are infinitely superior to the last, have been marketed. Rain is urgently required by all the citrus fruits in order to develop the prospective crop, and, unless such is experienced within a reasonable period, the lemons at least will to a great extent be rendered worthless.

Deciduous Fruits.—The first of the apricots, of which, owing to frost and hail, there will not be a large quantity, have been marketed. The returns have not yet come to hand; but it is not expected that they will equal those obtained last season, as the fruit is smaller.

Temporary Crops: Winter Cereals.—Harvesting of these crops has been completed, the results emphatically demonstrating that wheat-growing in this part of the State can be carried out as successfully as in other parts of the Commonwealth, providing the necessary preparatory work is carried out at opportune times.

Summer Crops.—Since the last of the winter cereals were sown in July, the ground has been in an unsuitable condition for satisfactory working—that is, with the exception of fallowed land. In consequence of this it has been practically impossible to get our summer crops in. To date, 2.75 acres have been sown with Japanese millet; 4 will be sown with sorghum, &c., for silage purposes within the next few days. The preparation of land for maize, &c., is being proceeded with so far as it is possible to do so.

Fodder Crops: Permanent: Lucerne, 1 Acre.—Mown, 11th October. Notwithstanding that this plot has only been down a short period, and

could not be expected to undergo the hardship which a longer established plot might, at present it is in many places 6 in. high, and the dark green of its foliage makes a pleasing contrast to its brown surroundings. It is hoped to considerably increase the area under this crop on the creek country, if for nothing else than grazing purposes.

Rhodes Grass: Area, 7 Acres.—Growing on land devoted previously to wheat for five years; looks well, and would furnish more food per plant than majority of native grasses growing under similar conditions. Its habit of growth is such as to enable it to respond more readily than our native tussock grasses to light rains.

Pastures.—These are practically bare—in fact, a good coat of grass has been an absent factor here for the past two years.

KAIRI STATE FARM.

By D. MACPHERSON, Manager.

THE HISTORY OF A NEW CLEARING.

I give the history of the No. 2 Clearing on the Kairi State Farm with a view to showing how quickly the heavily timbered country on the Atherton tableland can be brought into profit.

The clearing consists of 63 acres the falling of which was completed by 30th June, 1912, and cost £2 10s. per acre. It was burned, 1st November, 1912. Corn planting was begun on 1st December and finished on 4th January. Pumpkins were planted on a small portion, amongst the maize, from 15th January to 21st January, 1913. Rhodes grass seed was sown from 21st January to 7th February. The felling cost £157 10s.; burning and cutting roads, £12 4s.; grass seed, 5 lb. per acre, at 1s. 3d. per lb., £19 13s.; labour sowing grass seed, £5 16s.; first weeding and brushing, £13 14s. 8d. I estimate that it will take another £7 to finish this work. A total expenditure, which should be charged to capital account, of £215 17s. 8d., or £3 8s. 6d. per acre.

Fencing and providing water I have purposely left out, as these items differ so much according to varying circumstances.

	£	*s.*	*d.*
Seed maize cost	7	10	0
Labour planting	27	11	0
Pumpkin seed and labour planting	2	10	0
Harvesting and threshing maize	33	0	0
Harvesting pumpkins	2	10	0
	£73	1	0

Half the clearing was sown with imported Goldmine maize, which did not do well, and resulted in less than half a crop. The remaining half of the clearing was sown with selected local seed, grown on the farm, and, considering the quantity of grass amongst it, it did fairly well. There was no way of getting at the yield accurately, as the maize was used for home consumption, much of it being ground up, cob and all; but a

very safe estimate would be ¼ ton to the acre for Goldmine and ½ ton per acre for local maize, or, say, 23 tons in all—

	£	s.	d.
22 tons maize, at £5	110	0	0
12 tons pumpkins, at £1	12	0	0
	£122	0	0
Cost of planting and harvesting	73	0	0
Profit on maize and pumpkins	£49	0	0

The profit would have been considerably greater had the whole clearing been put in with local maize, instead of half with Goldmine; also, the cost of planting was increased on account of my planting about a sixth of the paddock with mattocks for experimental purposes, theis being much slower than the hand planters, while I was unable to see any advantage to the crop. Again, maize has been persistently above £5 per ton this year.

There was a splendid strike of grass all through the maize and on the day I finished corn-harvesting I turned 65 head of mixed cattle into the paddock. Unfortunately, I had soon after to separate the sexes and this cut the number of stock in the paddock down to 43. These were very poor but have thriven famously, and there is no danger but that there will be plenty of grass for them till Christmas. The only danger is that they will not have it sufficiently eaten back before the wet weather sets in. The paddock would easily carry a beast to the acre till the weather breaks, when, if desired, it would carry more, and that in spite of the fact that there have been only 116 points of rain in the last four months.

I have taken no account of the grass seed saved from this clearing, as I have not got it all threshed out yet; and I do not think it will have cost much less than its market price to harvest amongst logs and stumps. Neither have I counted the grass cut and chaffed and used for horses and milking cows, the amount used in this way being limited only by my requirements, and not by the amount available, which was practically unlimited; and it was noticeable that wherever grass had been cut for chaff there was the nicest and freshest feed for the bullocks.

COFFEE NOTES.

By C. E. WOOD, Manager Kamerunga State Nursery, Cairns.

As the picking season even in the most backward districts will now be over, it is essential that all necessary pruning should be done as soon as possible before being interfered with by blossoming. As soon as pruning is completed, the planter should endeavour to get his soil in as good a state of cultivation as possible. Owing to the tramping of both pickers and pruners, the ground all round the trees is bound to get compacted and set. If the ground on which the coffee is planted has been stumped and the trees still young, it will be best to use a one-horse plough, even though only three or four furrows can be run down the centre of rows, and, if cross-ploughing is done as well, all the ground

to within a few inches of the tips of branches will be worked. Unless the soil is a rich one, or if the crop is heavy, it will be well to apply a dressing of artificial fertilisers. This, with the cultivation, will put fresh vigour into the trees and make the setting of the coming crop more certain; if applied after the ploughing, the fertilisers will get well mixed with the soil by the subsequent harrowing and use of the scarifier.

The formula I have used this year is a mixture made in the following proportions:—

1 lb. sulphate of potash;
1½ lb. superphosphate;
1$\frac{1}{10}$ lb. dried blood.

Of this mixture 2 lb. were applied round the outside of each tree, and the good effects of the application began to show in from two to three weeks. Where the plough cannot be used, break up the ground round the trees with a fork hoe, so as not to interfere with any roots; and if, after applying the fertilisers, the ground is gone over again with the same tool, breaking all lumps, this will effectually cover and mix the manures with the soil. Other forms of nitrogen could be used, such as nitrolim or sulphate of ammonia, but, so far, I have found the dried blood act well. Where horse implements are used, it is advisable to use as narrow a swingle-tree as possible; also bind up the hooks of trace-chains with hessian or bagging, so as to prevent the branches of trees being caught and broken.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1913.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5 35	5·25	5·49	4·56	6·8	4·46	6·31
6	5.58	5·36	5·24	5·49	4·55	6 9	4·46	6·32
7	5·57	5·36	5·22	5·50	4·54	6·9	4·46	6·32
8	5·55	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·34
10	5·53	5·38	5 19	5·52	4·52	6·12	4·46	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4 46	6·35
12	5·51	5·39	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·15	4·47	6·37
15	5·47	5·40	5·14	5·55	4·50	6·15	4·47	6·38
16	5·46	5·40	5·13	5·55	4·49	6·16	4·47	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·18	4·48	6 39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·48	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·49	6·41
21	5·41	5·43	5·8	5·58	4·47	6·20	4·49	6·41
22	5·39	5·43	5·7	5·59	4·47	6 21	4·50	6·42
23	5·38	5·43	5·6	5.59	4·47	6 22	4 51	6·42
24	5·37	5·44	5·5	6·0	4·46	6·23	4·51	6·43
25	5·36	5·44	5·4	6·0	4·46	6·23	4·52	6·43
26	5·35	5·45	5·3	6·1	4 46	6·24	4·52	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·3	4·46	6 26	4·54	6·45
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
1 Sept.	●	New Moon	6 38 a.m.
7 ,,	☾	First Quarter	11 6 p.m.
15 ,,	○	Full Moon	10 46 ,,
23 ,,	☽	Last Quarter	10 30 ,,
30 ,,	●	New Moon	2 57 ,,
7 Oct.	☾	First Quarter	11 46 a.m.
15 ,,	○	Full Moon	4 7 p.m.
23 ,,	☽	Last Quarter	8 53 a.m.
30 ,,	●	New Moon	12 29 ,,
6 Nov.	☾	First Quarter	4 34 a.m.
14 ,,	○	Full Moon	9 11 ,,
21 ,,	☽	Last Quarter	5 56 p.m.
28 ,,	●	New Moon	11 41 a.m.
6 Dec.	☾	First Quarter	12 59 a.m.
14 ,,	○	Full Moon	1 0 ,,
21 ,,	☽	Last Quarter	2 16 ,,
28 ,,	●	New Moon	12 59 ,,

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1913.

Five thousand six hundred and twenty-five eggs were laid during the month. There are three ties for the monthly prize—viz., E. A. Smith (No. 2), J. Archibald, and Moritz Brothers; all White Leghorns; with 154 eggs each. So far the broodies have not been so numerous as they were in the two previous competitions. The following are the individual records:—

Competitors.	Breed.	Oct.	Total.
J. R. Wilson	White Leghorns ...	152	946
A. H. Padman, S.A.	Do.	145	920
O.K. Poultry Yards	Do.	140	896
T. Fanning	Do. (No. 2)	136	889
Loloma Poultry Yards, N.S.W. ...	Do.	152	885
Moritz Bros., S.A.	Do.	154	870
Range Poultry Farm	Do.	142	859
T. D. England	Do.	128	842
F. McCauley	Do.	124	834
E. A. Smith	Do. (No. 2)	154	830
S. E. Sharpe	Do.	121	827
R. Burns	Black Orpingtons (No. 2)	150	818
J. F. Coates	White Leghorns ..	140	813
H. Tappenden	Do.	136	801
J. Zahl	Do.	130	799
R. Burns	Black Orpingtons (No. 1)	149	797
Jas. McKay	White Leghorns ...	140	793
Cowan Bros., N.S.W.	Do.	133	789
A. T. Coomber	Do.	143	777
Doyle Bros., N.S.W.	Do.	145	773
Mrs. Munro	Do.	141	763
Mrs. Sprengel, N.S.W.	Do.	134	762
W. D. Bradburne, N.S.W.	Do.	151	754
E. A. Smith	Do. (No. 1)	148	751
H. Hammill, N.S.W.	Do.	144	745
Yangarella Poultry Farm	Do.	148	741
R. Jobling, N.S.W.	Do.	120	736
D. Grant	Do.	137	731
A. F. Camkin, N.S.W.	Do.	141	722
J. Gosley	Do.	115	716
J. Archibald, N.S.W.	Do.	154	694
A. Schbrowski	Brown Leghorns ...	129	693
T. Fanning	White Leghorns (No. 1)	148	686
C. Leach, N.S.W....	Do.	150	684
T. Stephens, N.S.W.	Do.	139	676
J. Murchie	Brown Leghorns ...	148	675
Mrs. Craig	White Leghorns ...	140	667
J. Anderson, Victoria	Red Sussex	127	643
Mrs. Bieber	Brown Leghorns ...	147	621
A. J. Collis, N.S.W.	White Leghorns ...	150	610
Totals	...	5,825	30,828

The Orchard.

CURING LEMONS.

BY CHARLES ROSS, F.R.H.S., Instructor in Fruit Culture.

There is no country where the lemon will thrive better than in Australia, and in our own State fruit of the finest quality can be produced on our coast lands as well as in the interior. [Especially at Barcaldine.—Ed. "*Q.A.J.*"]

Whilst the process of curing the lemon in the inland districts is a simple and inexpensive matter, on the other hand, nearer the coast, owing to the humidity of the climate, the best results are not always attained.

If it is not possible to cure the coastal product to keep as long as that of the interior, it can be kept sufficiently long after picking to vastly improve the condition of the fruit, and no one need be told the difference between the cured and the uncured lemon.

The bulk of the crop comes in during the cooler months, and is usually marketed at that time, straight from the tree. Growers complain that, after deducting expenses of growing, picking, packing, freight, cases, commission, and marketing, very little remains for their trouble.

The question then arises:—"Can we, instead of a thick-skinned, coarse lemon, deficient in juice, place on the market, at a more acceptable time of the year, a commodity possessing all the essentials required, such as a fine but tough skin, of a nice straw colour and full of juice?" In Italy lemons are grown on the tall-tree system. The fruit is produced well above ground, and is generally quite clean, and needs neither washing nor brushing. On account of the high-headed trees, it is necessary to use ladders when picking. When gathered for by-products, the lemons are pulled, but when required for export a small portion of the stem attached to the fruit is broken off with the finger and thumb, and the stem is afterwards clipped off close. They are allowed to wilt for three or four days before being graded and packed, which is often done in the orchard. The boxes are then transferred to the packing-shed, where the fruit is regraded, repacked, and wrapped before shipping. Sweating and colouring of the lemon is not practised in Italy as in the American method, and as the fruit hangs high from the ground it is not washed, which probably adds to the keeping qualities after reaching market. The dark green, also the tree-ripe, fruit is not considered so good for shipping for long distances as lemons that are picked when just turning colour. If the fruit has not already been wilted in the orchard, it is allowed to stand in the cases or in heaps for a few days in the packing-house.

Lemons for export to European markets are wrapped and packed in boxes and stored in fruit-rooms and cellars. When required for export, the cases are resorted and rewrapped. This wrapping prevents shrivelling, which would undoubtedly take place if the fruit were unwrapped and stored under these conditions; the fine texture of the fruit is also preserved.

A few of my own personal observations and experience may be useful to those who desire to enter upon this branch of the fruit industry. It is not my intention to say anything concerning cultivation or the suppression of pests, each of which subjects would require a paper to itself. It may, however, be remarked that lemons grown on loamy, strong loamy, or even clayey loams (provided that the drainage is perfect), have better keeping qualities and are better adapted for curing than those grown on light sandy soils.

It is also desirable to decide upon a system of growth between the high-headed, umbrageous method of Italy or the flat-topped bush system of California. The former has its advantages, such as requiring less labour in pruning, and the fruit remaining free from dust and brown rot, which occurs near the ground; but, on the whole, I favour the bush system. The finest examples of the bush or Californian system are to be seen at Helidon. These trees, when I last saw them, were perfect in shape, very healthy, quite clean, and carrying heavy crops. They had been pruned to a flat top, 8 to 10 ft. high, with a spread of branches 25 to 30 ft. in diameter, and well furnished with fruiting wood from the top to within 1 ft. of the ground, and with almost perpendicular sides. Such trees are easier of management as regards gathering, control of pests, and the minimum of ground necessary to be cultivated and cleaned.

The following remarks relative to my own experiments are based upon an adaptation of the Californian method:—

The first picking should commence when the fruit is from $2\frac{1}{3}$ to $2\frac{2}{3}$ in. in diameter, preferably when it is just changing colour. When picked at this stage and size and irrespective of colour, sufficient margin will be allowed for shrinkage during the process of curing. The fruit should not be left on the tree till it fully colours, or it will be coarse, thick-skinned, and contain less juice. The trees should be picked over every three or four weeks—with some varieties, continuous picking will last the year round. The more carefully the lemons are handled, the more perfectly they will cure. All bruising and indentations by the finger nails, twigs, sides of baskets, &c., must be avoided. Baskets, or whatever receptacles are used for picking, may be lined with any soft material. Unless the lemons are for immediate use, they should never be pulled off the tree, but clipped off close to the fruit. As the season for curing usually occurs after March, dry conditions begin to prevail, and there is not so much risk of blue-mould; but in this connection let me once more reiterate the importance of careful handling. Both European and American shippers recognise that the losses from blue-mould are largely the result of rough handling before being stored, and no doubt accentuated by abnormally wet weather.

Study and observation will enable the grower to understand the local conditions and to overcome climatic influences. Any cool, well-ventilated, darkened shed, away from stables and cowyards, will do for the curing. The floor, however, should be well above ground. When the lemons arrive at the packing-sheds, any scales, fumagine, or dust should be removed by washing or brushing before placing the fruit in the sweat boxes. Small machines for this purpose are procurable for about £10.

A simple and inexpensive device may be constructed on the farm to suit the purpose. Take a convenient-sized cask, which must be well padded inside; suspend it by means of short spindles at each end upon a frame in a similar way to an ordinary churn. The cask is nearly filled with lemons or oranges, with plenty of sawdust, and after a few revolutions the fruit is cleaned and polished without injury to the oil cells.

If the fruit requires washing, water is added; but the fruit will need drying before being placed in the sweat boxes.

A convenient size for the sweat box is 3 ft. by 2½ ft. by 6 or 9 in. deep, with a piece of sacking covering the bottom to prevent jarring. These are filled to three parts of their capacity, and stacked crosswise in convenient-sized blocks, about 6 or 8 ft. high, allowing air spaces between, but protected from strong breeze, which would cause the rind to shrivel and harden. What is required is a fine, velvety, toughened skin. The sweat stacks are covered with square hessian tents or sheeting for keeping off dust and providing evenness of temperature. In this condition they remain from 3 to 8 days according to weather.

After sweating, the fruit should be packed in the ordinary market cases and stacked in blocks 10 by 10 by 8 ft. high. A framework should be erected about 1 ft. higher than the top layer, and covered with sheeting and blinds suspended all round. The blinds may be laced at the side corners, leaving open vents at the top for securing efficient air circulation, with a fairly calm atmosphere. If subjected to strong draughts, the fruit would shrivel. During windy weather the canvas should be kept close down and tightly laced at the corners. When calm and warm, the curtains should be raised a few inches during the day, allowing any superfluous moisture to escape, while on still nights they can be taken right off and rolled up, and the stacks recovered early next morning. It is possible by this means to keep the temperature at not more than 90 degrees Fahr. After the fruit has been stored for a few weeks, the sheets will seldom want raising, but the cases should be examined from time to time. Under such conditions winter lemons may be kept for six months. It is not wise to attempt long keeping with the summer product.

Large, coarse lemons should be sent to the factory for by-products such as candying, and the smaller ones for the manufacture of essences, marmalades, &c.

It is very important before the lemons are stored that they be graded to colour as well as size, and each colour kept to itself.

The colouring of lemons by the sweating process may not be so necessary in this State; nevertheless, a few remarks may be of some help in connection with this subject relative to oranges.

Late varieties, such as the Valencia, when grafted on lemon stocks, have been found, after hanging a long time and on the approach of hot weather, to lose their bright orange colour and revert to the original green, and it may be found necessary to recolour and also to colour up quickly the green matured fruit of earlier varieties. After such fruit has been graded to the different shades of green, they are stacked as for curing, but in a close room or under doubled sheets. Kerosene stoves can be used for keeping up the temperature for oranges to 90 or 100 degrees Fahr., 100 degrees being the maximum. An absolutely dry atmosphere would cause shrivelling; therefore slight humidity should be maintained; but water must be used very sparingly.

To colour lemons, somewhat different treatment is required. The temperature should be kept as near 90 degrees Fahr. as possible, and the moisture should be kept nearer saturation point; in fact, beads of moisture should be noticed on the walls and ceiling of the room, which can be secured by placing vessels of water on the top of the stoves.

There seems to be an impression abroad that (like the curing of fish) there is some secret artificial process of curing lemons and other citrus fruits; but from all that I can learn this is not the case. Although some of the details necessary to local conditions in America and Europe have not been expatiated upon, the most important particulars, and such points as are most esential and applicable to our own coastal conditions have been set forth; and, if intelligently carried out in conjunction with the knowledge of detail demanded by local requirements, I see no reason why our product should not be offered in perfect condition during the hot months of the year, when a fine-skinned, juicy lemon is in most demand.

LAY-OUT OF AN ORCHARD.

Last month we reproduced an article by Mr. R. Gordon Edgell, of Bathurst, New South Wales, on "The Design of a Commercial Apple Orchard," which appeared in "The Farmer," published at Perth, Western Australia, to which journal we expressed our acknowledgment. We find, however, that Mr. Edgell's paper was first published in the July (1913) issue of the "New South Wales Agricultural Gazette," the official journal of the Department of Agriculture of that State, and it had, unfortunately, escaped our notice. Our attention has been drawn to the omission to acknowledge the original source of the article in question, and we are pleased to rectify the mistake which arose from the cause above stated. The blocks for the illustrations were kindly lent to us by the Editor of "The Farmer."

HAWAIIAN PAPAWS AT MARMOR.

The present season has been a fortunate one for papaw growers, and from several districts we hear of abnormally large fruit being produced. We have received from Mr. E. T. Edwards, of Dandaraga, Marmor, on the North Coast line, a splendid sample of the crop shown in the illustration of some of his papaw trees in this issue. It sometimes happens that very large fruit of this class has not the rich flavour of smaller ones, but the 10-lb. specimen gathered on the 23rd October last left nothing to be desired in point of flavour, and was just at the proper stage of ripeness. The eight large papaws on the child's left, in the photograph, weighed in the aggregate 71 lb. 15 oz. The tree is two years old, and the fruit, picked at intervals between 31st August and 23rd October, ranged in weight from 8½ to 10 lb. respectively. The sample forwarded to us measured 15½ in. in length with a diameter of 10¼ in., and weighed over 10 lb.

PAPAWS.

Mr. J. R. Wrench, secretary of the Childers P. A. and I. Society, gives the following account of some fine papaws grown by Mr. J. Gosley, Childers:—

"The season experienced in the Isis during the past twelve months has been one not alone favourable to the growth of sugar-cane (which crop, by the way, is a record one this year) but has also been extremely favourable for the growth and maturity of the papaw. Accompanying this description are two photos.—the one of a single papaw fruit, and the other of a papaw garden at the residence of Mr. J. Gosley, Childers. Mr. Gosley has twenty-two trees which are now exactly sixteen months old from the time of planting out, and the plants were three months in the seed bed (from the time of planting the seed), which makes the trees shown in the photo. not quite nineteen months old. The average height of the trees is 12 ft., and their circumference at the bottom of the trunk averages 28 in. They are planted 6 ft. apart. The ground when being prepared for the transplanting was manured with cow manure. The specimen shown in the photo., which is the largest fruit on any of Mr. Gosley's trees, was picked and exhibited at Comino Bros.', Childers, on 11th October. Its dimensions were 10½ in. high, 14½ in. long, 35½ in. in circumference lengthways, and 27 in. in circumference acrossways, and weight 14 lb. It was of a golden or yellow colour and of excellent flavour. The particular tree on which this fruit was grown is that on which Mr. Gosley is leaning in the photo., and it still bears over fifteen promisingly large fruit. The seed of this variety was introduced into the Isis by Mr. T. H. Wells, of Farnbro', Childers, from Hawaii about nine years ago, and is known here as the 'Hawaiian papaw.' Mr. Wells has grown them up to 12 lb. in weight."

PLATE 146.—HAWAIIAN PAPAWS ON MR. E. T. EDWARDS'S FARM, NEAR MARMOR.

Plate 147.—Papaws at Mr. J. Gosley's Residence, Childers.

Plate 148.—A 14-lb. Papaw from Mr. J. Gosley's Trees, Childers.

Animal Pathology.

VETERINARY NOTES.

PARALYSIS IN PIGS.

BY A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

Paralysis in pigs is brought about by several causes—viz., rheumatism, worms in the kidneys and surrounding parts, and by over-feeding young pigs on an exclusive diet of corn and water.

Treatment.—If due to rheumatism, see that the pigs are housed at night in a dry place and allowed to sleep on wood flooring instead of on concrete or earth. Give, daily, salicylate of soda 15 to 30 grs., and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms, I would recommend giving in the food or as a drench:—One teaspoonful of oil of turpentine; liquid perchloride of iron, 20 drops; and raw linseed oil, 3 or 4 oz. This is sufficient for 50 lb. body weight. It should be given after the animal has been fasting for some hours, and can be repeated several times with an interval of three or four days.

When due to feeding, as mentioned above, stop the corn, and give once daily in a mixed diet or in milk 1 dessert-spoonful of the following powder for every 100 lb. body weight, after it has been well mixed and powdered:—Sulphur, 2 oz.; sodium bicarbonate, 4 oz.; sodium sulphate, 2 oz.; black antimony, 2 oz.; sulphate of iron, 1 oz.; wood charcoal, 2 oz.

MEMORANDUM *RE* WHITE SCOUR IN CALVES.

The following treatment is recommended for White Scour in calves:—

Thorough cleanliness of calf pens, yards, feeding buckets, &c.; good clean milk given regularly, and in proper quantities (the quantity should be reduced somewhat until the bowels are normal). Isolate sick calves. Give two or three times daily, as a drench, in a little water or milk—

5 to 10 drops pure carbolic acid;
1 drachm glycerine;
1 oz. tincture of ginger.

Blood Scour is very fatal, and seldom amenable to treatment. In this case the cows are probably the cause, being frequently affected with contagious abortion; so that investigation should be made in this direction. Even when calves recover from this complaint, they seldom are of any profit to the owner, remaining unthrifty and puny.

Here, again, thorough cleanliness and isolation are essential. Limewash with carbolic acid should be freely used where practicable to walls, fences, &c., around sick animals.

As remarked above, treatment is of little service; but the medicine described for White Scour will answer the purpose, the chief part of it being the antiseptic—viz., carbolic acid.

SCRUB TICKS AFFECTING DOGS, FOALS, AND CALVES.

Scrub ticks cause a great deal of trouble to stockowners in certain districts, with a large percentage of mortalities. It has been stated that these ticks do not harm the animals during the first four days' attachment; so it is recommended that, where scrub ticks are prevalent, valuable animals should be thoroughly examined every second or third day.

It has been proved that trypan-blue injected under the skin is a specific for this disease in the dog; the paralysis soon improves, and in a few days the animal thoroughly recovers. One dose of the trypan-blue is usually sufficient.

A 2 per cent. solution (about 9 grains to a fluid ounce of water) is made by dissolving the trypan-blue in boiling water. A sediment falls as the solution cools; and this should be removed by filtering through a funnel, in which a properly folded filted paper is placed or a fine piece of clean linen which has been previously boiled.

The hypodermic syringe and needle, before being used, should be placed in a dish containing cold water; then placed over the fire, and the water boiled for some ten minutes. This thoroughly sterilises the syringe and needle, which are now ready to use when the solution to be injected has cooled.

The injection can be made anywhere under the skin; but the best positions are either in front of the chest or behind the shoulder, the skin in these positions being loose, a fold of which is easily caught up by the finger of the left hand, whilst the needle is inserted with the right hand.

It is advisable to clip off the hair and disinfect the spot chosen before introducing the needle.

The dose for dogs according to age and size varies from—

1 to 5 drachms; or
1 to 5 teaspoonsful.

The dose for calves and foals according to age and size varies from—

½ oz. to 2½ oz.; or
1 to 5 tablespoonsful.

SPACE TO BE ALLOWED TO EACH BIRD IN A HOUSE.

Mr. Cecil L. Byrne, late lecturer at the Royal Agricultural College, Sheffield, says:—"It may be well to give a definite rule for ascertaining how many birds a given house will contain healthy.

"The best way to find out how many fowls a house will hold is to multiply its length by its breadth, and its mean height, and divide by eight. This will give you the maximum number of birds. If not pressed for room, divide by ten. Here is an example: Take a house 6 ft. high, 6 ft. long, and 4 ft. wide—*i.e.*, 6 by 6 by 4 = 144 ÷ 8 = 18. Thus, such a house will hold eighteen birds."

Vegetable Pathology.

TESTING OF FARM SEEDS.

By J. C. BRÜNNICH and A. T. JEFFERIS.

Good soils in thorough tilth, suitable fertilisers, and favourable seasons are not sufficient to ensure successful crops, unless good reliable seeds are used. Nothing can be more disappointing to a farmer than bad seeds, as using such not only leads to a more or less complete loss of crops, with waste of time and labour, but may be also the cause of introduction of many noxious weeds and diseases. Troubles so introduced may spread from the original centres until huge areas of agricultural lands are affected, rendering them more or less useless for cropping or grazing. Restoration of such lands and eradication of weeds and diseases may only be accomplished with enormous expense and labour.

For these reasons systematic seed-testing has become the general practice in nearly all European countries. In Germany, farmers rely entirely on guaranteed seeds. The testing of seeds has there been carried out for over forty years, in special institutes, seed control stations generally connected with experimental stations, and agricultural colleges.

Our first official tests were made in 1911 (reported in "Queensland Agricultural Journal," December, 1911); and, on the whole, the seeds then tested were found of very satisfactory quality, although taken towards the end of the season.

This year the testing was repeated on a much larger scale, as 148 samples of seeds were collected from 14 metropolitan retail and wholesale merchants, all of whom readily granted permission for the taking of samples.

The results, which are given in tabulated form, are on the whole satisfactory, as the quality of the seeds is in the great majority of cases excellent, both as regards purity and germinating power. Nearly all the samples tested were clean and free from foreign seed and impurities.

In all the twelve samples of lucerne tested there was no occurrence of the dreaded parasite dodder, which plays such havoc with that crop in other countries.

A column showing the percentage of seeds germinating in the first week is also given, as the rapidity or energy of germination is an important factor, especially in a climate where rainfall is frequently fitful. Many farmers have experienced disappointment with poor crops, due to tardy and uneven germination of seeds.

The column showing weight in grams of 1,000 seeds gives an indication of size and plumpness of the seeds, and the number of seeds in 1 oz. may be ascertained by dividing 28,350 by this weight.

For instance, lucerne seed (No. 668), of which sample 1,000 seeds weigh 2.08 grams, would contain $\frac{28,350}{2 \cdot 08} = 13,629$ seeds per 1 oz.

The grass seeds again germinated only with great difficulty, and one of the reasons may be the early start of these tests, which were commenced at the beginning of August; still, the fact that some of the grasses—Prairie grass No. 201, Paspalum No. 703, Rib grass No. 715, and Timothy grass No. 716—gave a high percentage of germination, under exactly the same treatment, appears to indicate that the quality of the other grass seeds was at fault.

Many factors influence the germination of the seeds in the field, and, although the seed may give an excellent germination test, the soil itself may contain bacteria which may retard or even destroy the germs and lead to the rotting of the seeds in the ground.

Lab. No.	Variety of Seed.	Merchant.	Weight of 1,000 Seeds in Grams.	Impurities. Actual per cent.	Impurities. Kind of Impurities.	Germination per cent.	Germination Energy per cent. in 7 Days.
573	Wheat	M	52·5	Nil	..	96·0	90·0
574	Barley, Skinless	C	29·1	Nil	..	99·5	99·5
575	Barley	C	50·0	Nil	..	94	94
576	Barley, Cape	N	45·0	Nil	..	98	86
577	Oats, Algerian	C	32·8	Nil	..	99	99
578	Oats, Algerian	G	30·0	Nil	..	100	100
579	Oats, Dunne	C	27·5	Nil	..	92·5	91
580	Oats	N	50·0	Nil	..	100	86
581	Rye	C	21·5	Nil	..	90	86
582	Rice, Paddy	A	28·6	Nil	..	91·5	85·5
583	Rice	F	30·0	Nil	..	88·0	88·0
584	Panicum, White	A	2·83	Nil	..	84·0	84
585	Panicum, White	B	3·34	Nil	..	96·0	95
586	Panicum, White	C	3·33	Nil	..	84·5	78
587	Panicum, White	K	2·55	Nil	..	13·0	1
588	Panicum	B	2·21	4·68	1 var. weed seed	81·5	78
589	Panicum	C	3·09	Nil	..	100	99
590	Panicum	D	2·00	3·4	1 var. weed seed	91·0	89
591	Panicum	H	2·41	Nil	..	80·0	77·5
592	Panicum, Giant	C	2·27	Nil	..	60·0	59·0
593	Panicum (*Setaria Germanicum*)	K	2·06	Nil	..	91·5	91·5
594	Millet, Japanese	A	3·82	Nil	..	90·0	90·0
595	Millet, Japanese	B	3·67	1·2	1 var. weed seed	89·5	84
596	Millet, Japanese	L	2·80	Nil	..	64·5	64
597	Millet, Japanese	M	2·82	Nil	..	50·5	44
598	Millet, Hungarian	F	2·60	Nil	..	82·5	75·5
599	Imphie	B	17·38	Nil	..	64·5	40·0
600	Imphie	D	19·9	Nil	..	86·0	84·5
601	Imphie	K	19·47	Nil	..	93·5	88·0
602	Imphie	L	16·71	Nil	..	67·5	66·5
603	Sorghum	A	16·23	Nil	..	88·5	53·5
604	Sorghum	B	23·60	Nil	..	78·0	42·0
605	Maize	N	382·5	Nil	..	95·0	95·0
606	Kaffir Corn	A	35·5	Nil	..	100	100
607	Sunflower, Giant	A	107	Nil	..	80	80

Lab. No.	Variety of Seed.	Merchant.	Weight of 1,000 Seeds in Grams.	Impurities. Actual per cent.	Impurities. Kind of Impurities.	Germination per cent.	Germination Energy per cent. in 7 Days.
608	Sunflower	E	97·5	Nil	..	85	50
609	Cow Pea	A	175	Nil	..	100	95
610	Cow Pea, Black	C	189	Nil	..	85	60
611	Cow Pea, Black-eyed Susan ..	C	235	Nil	..	100	100
612	Cow Pea, Purple	E	200	Nil	..	100	95
613	Cow Pea	K	160	Nil	very poor sample	35	0
614	Cow Pea	L	180	Nil	..	95	95
615	Field Pea	A	105	Nil	..	100	100
616	Pea, Scotch Grey	C	107	Nil	..	100	100
617	Pea, Yorkshire Hero	E	360	Nil	..	95	95
618	Pea, Sherwood..	E	365	Nil	..	100	100
619	Pea, American Wonder ..	E	270	Nil	..	100	100
620	Pea, Australia	F	365	Nil	..	100	100
621	Pea, Richard Seddon ..	F	362	Nil	..	100	100
622	Pea, Gladstone	F	345	Nil	..	100	100
623	Pea	N	220	Nil	..	100	100
624	Pea	J	225	Nil	..	100	100
625	Lentil	A	85·0	Nil	..	100	100
626	Bean, Broad Windsor ..	E	20·50	Nil	..	95	95
627	Bean, Broad	E	1,710	Nil	..	90	90
628	Bean, Lima	E	1,125	Nil	..	90	89
629	Bean, Lima Bush	F	615	Nil	..	100	100
630	Bean, Lima Climbing ..	F	1,240	Nil	..	85	85
631	Bean, Kentucky Wonder ..	F	337·5	Nil	..	95	95
632	Bean, Canadian Wonder ..	K	350	Nil	..	100	100
633	Bean, Saddleback	E	397	Nil	..	65	60
634	Bean, Improved Bush Lima	E	1,720	Nil	..	95	95
635	Bean, Soya	A	156	Nil	..	45	45
636	Bean, Kentucky Wonder ..	A	345	Nil	..	100	100
637	Bean, Lima	A	1,120	Nil	..	100	100
638	Bean, Tic	C	460	Nil	..	100	100
639	Pumpkin	F	442	Nil	..	85	0
640	Pumpkin	N	353	Nil	..	90	0
641	Water Melon, Cuban Queen ..	F	110	Nil	..	100	0
642	Watermelon, Fordhook's Early	F	100	Nil	..	80	0
643	Water Melon, Iceberg ..	F	133	Nil	..	60	0
644	Rock Melon, Long I. Beauty..	F	37·5	Nil	..	75	0
645	Cucumber, Remaining Greek	F	36·0	Nil	..	60	0
646	Lettuce	K	1·08	Nil	..	93·5	93
647	Cabbage, John Day	F	3·82	Nil	..	97	93
648	Cauliflower	F	3·17	Nil	..	42·5	34·5
649	Rape	C	4·25	Nil	..	87	84·5
650	Rape, Dwarf Essex	E	4·44	Nil	..	82	79
651	Mustard	E	6·23	Nil	..	96	96
652	Parsnip	F	4·92	Nil	..	65	0
653	Parsnip	K	4·74	Nil	..	72	0
654	Turnip, Milan Strap Leaf ..	F	2·26	Nil	..	100	100
655	Onion, Large Red Italian ..	F	3·86	Nil	..	70	67
656	Salsify	F	11·98	Nil	..	78	9
657	Silver Beet	F	14·91	Nil	..	128 shoots	
658	Sugar Beet	A	10·0	Nil	..	148 shoots	
659	Sugar Beet	E	13·0	Nil	..	80 shoots	
660	Red Beet	K	13·5	Nil	..	132 shoots	
661	Mangels, Long Red	C	25·0	Nil	..	156 shoots	
662	Mangels, Yellow Globe ..	C	14·0	10·1	3 var. of seeds and insects	166 shoots	
663	Mangels	K	15·0	Nil	..	40 shoots	
664	Rhubarb, Giant American ..	F	15·0	Nil	..	100	5
665	Raddish	F	8·17	Nil	..	91	86

Lab. No.	Variety of Seed.	Merchant.	Weight of 1,000 Seeds in Grams.	Impurities. Actual per cent.	Impurities. Kind of Impurities.	Germination per cent.	Germination Energy, per cent. in 7 Days.
666	Tomato, Tucker's Favourite..	F	3·74	Nil	..	81	2
667	Tomato, Matchless	F	3·41	Nil	..	89·5	0
668	Lucerne	A	2·08	Nil	..	92·5	81·5
669	Lucerne	B	1·91	Nil	..	95·0	93·5
670	Lucerne	E	2·28	Nil	..	54·5	32·0
671	Lucerne	I	2·09	Nil	..	92·0	83·0
672	Lucerne	J	2·21	Nil	..	79·0	63·5
673	Lucerne	K	1·82	1·0	7 varieties	99·0	90·0
674	Lucerne	L	1·94	Nil	..	78·0	78·0
675	Lucerne, Hunter River ..	M	2·03	Nil	..	97·0	86·0
676	Lucerne, Hunter Ricer ..	B	2·09	Nil	..	88·5	80·5
677	Lucerne, Downs	B	1·93	9·7	5 var. and cinders	72·0	59·0
678	Lucerne, Peruvian	B	1·98	3·20	12 varieties	85·0	81·5
679	Lucerne, Downs	M	2·18	3·10	1 var. and cinders	78·5	75·0
680	Clover, Dutch White	E	0·66	..	5 varieties	81·5	62·5
681	Clover, Yellow Trefoil ..	E	1·63	Nil	..	64·5	60·0
682	Clover, Red	E	1·63	Nil	..	88·5	72·5
683	Clover, Red	K	1·71	Nil	..	95·5	93·5
684	Clover, Scarlet	K	3·88	1·7	4 varieties	100	100
685	Clover, Alsyke	K	·65	5·2	7 varieties	63·5	51
686	Clover, Trefoil	K	1·66	1·1	8 varieties	89·5	89
687	Clover, Cow Grass	B	1·86	Nil	..	16·5	10·5
688	Rhodes Grass	A	·330	Nil	..	32	Nil
689	Rhodes Grass	B	·360	Nil	..	28	Nil
690	Rhodes Grass	G	·300	Nil	..	14	Nil
691	Rhodes Grass	N	·300	13	2 varieties	23·5	Nil
692	Rhodes Grass	H	·245	9	Straw ..	5·5	Nil
693	Rhodes Grass	I	·340	Nil	..	10	Nil
694	Rhodes Grass	L	·290	Nil	..	16	Nil
695	Rhodes Grass	M	·295	Nil	..	22·5	Nil
696	Couch Grass	A	·268	Nil	..	0	Nil
697	Couch Grass	C	·240	Nil	..	0	Nil
698	Couch Grass	E	·260	Nil	..	6	Nil
699	Couch Grass	H	·240	5	Chaff ..	1	Nil
700	Couch Grass	K	·290	Nil	..	4	Nil
701	Prairie Grass	B	9·08	Nil	..	79·5	Nil
702	Prairie Grass	H	9·20	4·8	Chaff ..	25·5	Nil
703	Prairie Grass	I	8·08	3·3	5 varieties	86	Nil
704	Paspalum	B	1·04	Nil	..	1	Nil
705	Paspalum	C	1·09	Nil	..	1	Nil
706	Paspalum	E	·657	Nil	..	6	Nil
707	Paspalum	F	·820	Nil	..	1	Nil
708	Paspalum	H	1·00	Nil	..	0	Nil
709	Paspalum	I	1·21	Nil	..	7	Nil
710	Paspalum	J	·880	Nil	..	1	Nil
711	Paspalum	L	1·11	Nil	..	5	Nil
712	Bromus Inermis	A	4·06	Nil	..	1	Nil
713	Kentucky Blue Grass ..	A	·160	Nil	..	16	Nil
714	Maw Seed	E	·895	Nil	..	9	Nil
715	Rib Grass	E	1·56	Nil	..	69	Nil
716	Timothy Grass	E	·325	Nil	..	89	Nil
717	Chloris Barbata	C	·373	Nil	..	6·5	Nil
718	Rye Grass	C	1·96	Nil	..	12	Nil
719	Italian Rye Grass	E	2·24	Nil	..	50	Nil
720	Rye Grass	J	1·88	15	7 varieties	3	Nil

Entomology.

ENTOMOLOGICAL PAPER.

By EDMUND JARVIS, Assistant Entomologist.

(Read at the Fruitgrowers' Conference at Nambour, November, 1913.)

I wish to bring under your notice a few entomological facts that materially affect the welfare of this important industry, and relate more particularly to some of the fruits grown at Nambour for marketable purposes.

Before dealing with the strictly entomological side of the question, I should like to remind you that some of the chief factors in the control of insect pests are of a preventive character, and that it will pay better to be on the alert, and watchful for early indications of the presence of such insects than to close your eyes until the enemy has taken possession of the field and is securely entrenched on all sides.

Small beginnings usually have great endings. Take, for illustration, the history of the notorious Grape-vine Louse (*Phylloxera vastatrix*), which is stated to have been introduced into France on vines from North America in 1863, and in thirty-three years to have cost that country the enormous sum of £100,000,000, and spread throughout the world.

It must not be forgotten that plants, to be healthy, require a proper amount of food and moisture, and that such needs necessitate good cultural conditions.

This fact is, unfortunately, often overlooked, and few farmers appear to realise that ill-health, which is usually denoted by a weakly state of growth, invites attack from various fungus and other diseases which are always awaiting a chance to invade the tissues of sickly plants unable to offer much resistance.

Especially is this the case with citrus fruits, which, unless liberally treated, are not only likely to sustain serious injury from fungus diseases, but are peculiarly liable to become infested with scale insects, which quickly multiply, and are often followed by the appearance of fumagine—a fungus known as sooty mould that grows on a sugary substance secreted by such insects, and by covering the leaves interferes with the proper respiration of the trees.

SCALE INSECTS.

About fifteen kinds of scale insects are known to occur on citrus trees in the Brisbane district; but some are far more harmful than others, the four best known and most injurious species being the formidable Red Scale (*Aspidiotus auranti*), the White Scale (*Chionaspis citri*), the Mussel Scale (*Mytilaspis citricola*), and the Pink Wax Scale (*Ceroplastes ruber*).

The first of these—the Red Scale—has a world-wide distribution, and in Africa, Western Australia, and parts of America is considered the most important pest of the orange and lemon. This insect is reputed to injure the tree more quickly and permanently than any other citrus scale, and to sometimes kill it after one or two years' infestation. It attacks all parts of the tree, and, in addition to causing the foliage to drop, often disfigures the fruit and renders it unsaleable. A capital illustration of such fruit injury is included amongst the spirit specimens exhibited at this Conference by the Department of Agriculture and Stock.

The White Scale, although less injurious, is an exceedingly troublesome pest, but more conspicuous than the preceding. Unlike the Red Scale, the sexes of this species differ from each other in size, shape, and colour, the male being white and oblong in form, while the mussel-shaped female is considerably larger, and, owing to its dark-brown colour, which resembles that of bark, often overlooked.

One sometimes sees neglected citrus trees so grossly infested with this species that, from a little distance, the trunk and main branches look as though they had been partially whitewashed, and, upon closer inspection, the fruit on such trees is invariably found to be small and worthless.

The common Mussel or Purple Scale is another cosmopolitan insect, but not so generally distributed as the Red Scale. It attacks all parts of the tree—in bad cases generally spoiling the fruit and occasioning much loss of foliage—but, fortunately, affects mostly the lower branches, often destroying these, but not, as a rule, killing the tree.

The Pink Wax Scale is fast assuming a more important economic status in Queensland, and bids fair to soon become one of our most troublesome scales.

It already attacks several fruit trees, to say nothing of a large number of ornamental trees and shrubs that are rendered unsightly by sooty mould which marks its unwelcome presence.

Most growers are familiar with this pinkish-white waxy-looking scale, rather lumpy in appearance, varying in size from a mere speck up to a quarter of an inch, and generally found near the centre of a leaf or arranged in a row along the midrib.

CONTROL MEASURES.

Fumigation with hydrocyanic acid gas is without doubt the best remedy for scale insects.

The Red and especially Purple Scales are more resistant to this treatment than many other kinds, the dosage advised for these two species being 1½ oz. of potassium cyanide, 98 per cent., to every 100 cubic feet of air space. One ounce of potassium cyanide requires 1 fluid ounce of sulphuric acid, 93 per cent., and 3 fluid ounces of water.

By this treatment all scales present are destroyed; but spraying with resin wash or other solutions, although undoubtedly beneficial, does not kill every insect, and has to be repeated at intervals.

White Scale is easily controlled by fumigation similar to that recommended for Red and Purple Scales. When present in quantities on the trunk and branches, it is a good plan to wash these portions of the tree with a mixture composed of lime, sulphur, and soap, applied with a stiff brush.

Painting the trunk, &c., with a preparation consisting of sulphur, lime, and fine clay or flour has also been advocated, and is prepared as follows:—

> Boil 2 lb. of sulphur and 1 lb. stone lime in 2 gallons of water for an hour and a-half; then add 3 lb. more stone lime, and boil half an hour. Make up with boiling water to 2 gallons, and add enough fine flour or fine clay to the mixture to make it of the consistency of thin paint.

Pink Wax Scales are exceedingly difficult to destroy when in the adult state, the females being almost proof against either fumigation or spraying.

At certain times of the year, however, the eggs contained within the female tests hatch into young active larvæ, which swarm in myriads over leaves and twigs, and being unprovided at this time with scales may be easily killed by spraying with kerosene emulsion or resin wash.

There are two broods during the year—one in spring, starting about the beginning of October and lasting about five weeks; and another in autumn during March. A careful lookout should be kept for the first appearance of these larvæ, and prompt action taken before they have had time to form a waxy covering, as they grow rapidly and soon become proof against insecticidal treatment.

My thanks are due to Messrs. Stock and Collier, of Woombye, who have found as a result of experimentation that cyanide of potassium (1 lb. to 2 lb. in 40 gallons of water) is a successful remedy for Pink Wax Scale during the winter season. In very bad cases they advise two or three applications of this spray.

Such information is often valuable to a large section of the community, and I should like to point out, in this connection, that growers as a whole could often materially assist the Department of Agriculture by keeping in closer touch with its Entomologist and advising him of the results of any experimental work they might conduct with reference to insect pests of fruit, vegetable, or cereal crops, &c.

FRUIT FLY.

The question of fruit-fly control has long occupied the attention of entomologists the world over, and is still one of our most perplexing problems, as control measures must always be more or less unsatisfactory owing to the presence in all countries of numerous wild fruits that afford breeding ground for the fly, and are difficult or well nigh impossible to eradicate. Our destructive species (*Dacus Tryoni*) is too well known to need description, so I will pass on at once to a consideration of the most approved methods for combating it.

Clean cultural methods are of the first importance, and consist in stripping trees of all infested and ripe fruit, and picking up and destroying all fallen fruit.

The odour of kerosene is attractive to male fruit flies, thousands of which may be easily captured in traps baited with this oil and hung among the branches of fruit trees, but, up to the present, no substance or liquid similarly attractive to the female fly has been discovered.

The well-known practice of spraying the foliage with poison bait has been attended with beneficial results, although considered by some to be impracticable, and it interferes with bee culture.

Mally's poison bait is made after the following formula:—

Brown sugar, 3½ lb.;
Arsenate of lead, 5 oz.;
Water, 5 gallons.

Other methods consist in destroying, as far as possible, all native food plants growing in the vicinity of orange groves, as well as such trees as loquats, guavas, worthless peaches, &c., &c.

About a dozen kinds of native fruits are known to harbour the fly, such as cheese-wood, wild passion-fruit, native pomegranate, country almond, crow's apple, black apple, native olive, solanum, &c., &c.

The natural enemies of fruit flies have been much studied of late years, and efforts made, in some instances, to enlist the services of various predaceous beetles and parasites. Dr. Sylvestri has recently succeeded in obtaining several hymenopterous parasites in West Africa and transporting them to Hawaii in a living condition.

One of these parasites oviposits within the eggs of the fruit fly, and it is reported that maggots hatched from affected eggs bore into the fruit, but still carry within their bodies the larvæ of the parasite which ultimately destroy them before they can reach maturity.

It is hoped that this useful parasite may become established in Hawaii, as it could do good work by parasiting fruit-fly maggots occurring in large fruits.

PINEAPPLES.

It is pleasant to reflect that so important a fruit as the pineapple is seldom seriously damaged by injurious insects. Mealy bugs are occasionally troublesome on the bases of the leaves and fruit stems, but are, as a rule, well controlled by natural enemies. This advantage, however, is to some extent counterbalanced by injuries inflicted by various fungus diseases such as heart rot and leaf spot, &c., the former of which occurs occasionally during late winter months, and is responsible at times for considerable losses. Prolonged wet apparently favours its occurrence, particularly on badly drained land, or on soils containing a large percentage of sand in which water rises readily by capillarity.

Leaves of pineapples affected by heart rot gradually lose their normal dark-green colour and assume a faint yellowish tinge, the extreme

points becoming dry and slightly twisted, and at this stage, if a leaf be gently pulled, it will come away from the crown, bringing with it all the heart leaves forming the centre of the plant, the basal portion of which will be found quite decomposed and emitting an offensive odour. Mr. Tryon, who investigated this disease in 1893, attributes it to a fungus induced by unsuitable soil conditions, and noticed that it was not present on well-drained land.

It is interesting to note that a very similar malady known as "base rot" of pineapples occurs in Hawaii, and is said to be due to the fungus *Thielaviopsis paradoxa,* which also causes soft rot and brown rot of the pineapple. Experiments have shown that drying the plants for one week before planting gave a reduction of 90 per cent. in severe cases of rot, and that low stripping (viz., removing as few as possible of the leaves at the base of the cuttings) gave a reduction of 59 per cent. over high stripping. These simple control methods might prove serviceable against heart rot in this country, and would certainly be worth trying.

AN INSECT ENEMY OF NUT GRASS.

Mr. E. JARVIS, Assistant Government Entomologist, has furnished the following report on an alleged destroyer of nut grass, with which experiments have been made at Bundaberg:—

In compliance with instructions, I visited Bundaberg on the 17th instant to study the economy of an insect said to be killing nut grass, and have the honour to submit the following report:—

The parasite in question is one of the Coccidæ or scale insects belonging to the genus *Antonina,* and apparently indentical with *Antonina australis,* Green, a noted destroyer of this weed.

The adult female coccid is enveloped in a crust-like shell formed of a somewhat floury white secretion, which when broken open discloses a dark purplish soft-bodied insect about as big as a pin's head, and attached to the nut or root by a hair-like proboscis.

PREVIOUS OCCURRENCE.

This beneficial insect was discovered on nut grass at Singleton, New South Wales in 1903, and was identified by Mr. E. E. Green, of Ceylon, as a species of *Antonina*—which he named *Antonina australis*—a conclusion approximately identical with that previously arrived at by the Queensland Government Entomologist. Mr. Green's identification did not induce Mr. Tryon to alter his views regarding this insect, and in a report dated 7th September, 1903, he writes:—"I am not at present disposed to recommend any departure from our opposition to its introduction that I have already counselled."

In a later report (1905) he called attention to the fact that since its discovery in 1903 no further news of its usefulness had been forthcoming, and its utilisation for destroying nut grass in New South Wales had been either abandoned or ceased to be spoken of.

The most recent occurrence of this coccid appears to be one that came under my notice in June, 1912, when Mr. Tryon handed me a number of specimens which he had discovered attacking roots of buffalo grass at South Brisbane.

THE PARASITE AT BUNDABERG.

The present appearance of this insect has evidently been attended with highly beneficial results, affording valuable evidence of its usefulness. Mr. F. L. Nott—who kindly extended me his hospitality whilst at Bundaberg—states that about three years ago he obtained a small bag full of infested grass roots from Mr. E. Lane, of Oakwood, who had told him of the insect's habits.

He planted pieces of these diseased roots among his nut grass, in a row alongside a fence, at intervals of about 20 ft. apart, and, finding upon examination a few months later that the parasites were spreading rapidly, was encouraged to infect other patches.

He started these experiments three years ago on 1½ acres, and at the present time has no continuous areas under the weed, and has practically destroyed all the nut grass on 20 acres of land. His soil is red volcanic of a heavy nature, but containing no sand or clay. Mr. Nott volunteered the following information, the truth of which was confirmed by my own observations:—

1. That he has never found these coccids on roots of sugar-cane or fodder grasses, although often using the former as a smother crop.
2. That they thrive best on land that is fairly open and allowed to remain undisturbed, but in consolidated soils or roadways, &c., spread with difficulty.

HOW TO USE THE PARASITE.

The plan of procedure adopted and found successful is as follows:—

Pieces of infested nut grass are planted in rows across the area to be treated, from 40 to 50 ft. apart, and 20 ft. from plant to plant, each piece being placed about 3 in. below the soil against the root of a flourishing clump of the weed. Operations are then suspended for a few months to allow the coccids to become established and extend a few feet from the infected centres, after which the ground is ploughed, harrowed, and planted with a cover crop of lucerne, sugar-cane, or pasture.

No cultivation is permitted until at least twelve months after the death of the grass tops, as the parasites are still at work destroying the lower roots, and should be allowed time to traverse and kill every nut.

Ploughing and harrowing amongst the newly-established colonies is, I think, a drawback to the above method, but, whilst doubtless killing a large percentage of the insects, would at the same time ensure their even distribution to all parts of the field, thereby saving the hand labour of closer planting.

SOME INTERESTING QUESTIONS.

(1.) Why have several previous attempts to utilise this parasite for killing nut grass proved unsatisfactory elsewhere?

Possibly soil conditions were unfavourable in some instances; the parasites are very likely unable to penetrate deeply into heavy compact clays or stiff wet soils, and in such cases the lower nuts would remain uninjured.

The land may have been disturbed too soon after treatment, thus causing the exposure and death of the majority of coccids.

Neglecting to plant a cover crop, or introducing the parasites at an unfavourable season, or when in a dying condition, brought about perhaps by prolonged exposure or damage during transit, would also tend to result in failure.

(2.) Will the coccids after exhausting the supply of nut grass attack other plants?

This is a matter for further research, but evidence so far seems to favour the supposition that their range of food is very limited. I examined the roots of sugar-cane and a few grasses, including buffalo, growing among a mat of dead nut-grass leaves that had been killed by the parasite, but found them unaffected.

In 1904 Mr. Froggatt published the following valuable information on this heading:—"Of course there is always the danger that a root-infesting coccid may change its habits, and attack other than its natural food plant, and this was pointed out to our correspondents anxious to try experiments. To me this danger appears to be slight in this instance, as after two years the nut-grass *Antonina* has not been found upon any other roots; and, secondly, that none of our grass or root crops are allied to or like the underground rhizomes of this obnoxious sedge. Again, among the described species of the genus, all of them seem to attack only one kind of food plant."

Many insects are very exclusive in matters of diet, and will perish rather than eat uncongenial food. Some of the cochineal insects, for example, which are closely related to the parasites under consideration, are confined to a single species of *Opuntia,* and cannot be induced to feed on allied plants of the same genus.

(3.) Do these coccids suffer periodically from the attacks of natural enemies; and, if so, to what extent?

This must remain an open question for the present. I have, however, collected material that may throw some light on the subject.

CONCLUSION.

I see no reason why the services of this insect should not be successfully utilised for the purpose of destroying nut grass in Queensland in districts where soil conditions are favourable to its spread; and, provided that Mr. Nott's method of treatment be adopted, it seems reasonable to assume that the results recently achieved at Bundaberg should be possible elsewhere.

General Notes.

PECULIAR FREAK OF NATURE.

A correspondent (Mr. H. I. Tubbs, of Redcliffe) says that a cow belonging to a resident there gave birth to a calf, and for six weeks was milked, giving 10 quarts a day. She did not come home after this for three days, when she arrived with another heifer calf, strong and healthy, and again gave "beastings milk" as when calving the first time. Mr. Tubbs added that he has been used to cattle all his life, but never came across a similar case. Mr. W. G. Brown, Sheep and Wool Expert, to whom the matter was mentioned, says he has only known this to occur at rare intervals with sheep, and the matter is capable of simple veterinary explanation.

DESTROYING GRASS AND WEEDS ON GARDEN PATHS.

Experiments recently carried out by Mr. H. C. Coggins (Assistant Inspector of Agriculture, New South Wales) as to the efficacy of arsenite of soda for killing grass and weeds on garden paths are noted in the "Agricultural Gazette of New South Wales" (2nd October).

"The experiment was arranged to test various strengths as follows:—

No. 1.—1 lb. arsenite of soda to 2 gallons of water.
No. 2.—1 lb. arsenite of soda to 4 gallons of water.
No. 3.—1 lb. arsenite of soda to 6 gallons of water.
No. 4.—1 lb. arsenite of soda to 10 gallons of water.

The path selected was a gravel one, 100 yards long, the edges of which were covered with couch grass and small weeds. The experiment was carried out in December, the weather being hot and dry. The final examination showed that Nos. 1 and 2 killed the couch and weeds; but Nos. 3 and 4 only partially killed them, and after the heavy rains they revived, and are now growing vigorously. On Nos. 1 and 2, there was no growth of couch at all, and only a few weeds, the seed of which were apparently washed there by the recent heavy rains.

If the affected path can be raked prior to spraying, so much the better, as this operation exposes the roots.

"The most opportune time to spray is in the heat of summer; and if the work is done towards nightfall, the poison has a better chance of soaking in during the night and getting to work on the roots. The spray is very cheap, No. 2 costing 1s. 3d. per 10 gallons.

"An ordinary watering-can may be used, but care should be taken to rinse it out with hot water after spraying. Care should also be taken to keep all stock off the treated area for a period of at least four weeks."

ITEMS OF INTEREST FROM "THE AUSTRALIAN SUGAR JOURNAL."

TOBACCO AT MOSSMAN.

A visit was recently paid to the Mossman district by Mr. H. Newport, Instructor in Tropical Agriculture. Upon his return to Cairns he stated that he had visited several settlers, and found that two who had gone in for tobacco culture had had a fairly good season, and some fine leaf had been produced. The last of the crop was now being despatched, and the land being broken up for next year. The average price realised was 1s. 6d. per lb., which was highly payable. There is no doubt (remarked Mr. Newport) that, with proper soil selected and with due attention to cultivation, tobacco-growing lends itself to North Queensland, because there is a reasonable return, and one man could carry on all the cultivation operations.

MOUNT JUKES COFFEE COMPANY.

The Mackay-Mount Jukes Coffee Company have just completed the picking of their coffee crop at Mount Jukes. The yield this year is over 6 tons, valued at about £600. The company have also just commenced to harvest their first cane crop, and on analysis the density of the cane has proved to be very good, a gratifying response to the expense undertaken in bringing that prolific district into connection with the mill at Marian.

GOOD MEN EARN GOOD MONEY.

In shifting 2,105 tons of cane from the Owen's Creek (Mackay district) tram to railway trucks, three men made £23 each for the month of July, working only 8 hours daily. A cane hoist is provided, and the Pleystowe Company, for whom the work is done, supply a horse to work it, without charge to the contractors. At the Pinnacle lift, where the men find their own horse, 1d. per ton more (9d.) is paid, and these men made £25 18s. each for the same month.

TROUBLES OF FIJIAN BANANA-GROWERS.

According to advices from Suva, the banana-growers of Fiji are in serious trouble in consequence of the action of the shipping companies in increasing the freights to Australia, and a meeting was held last month to take the matter into consideration.

Mr. H. M. Scott, who presided, said that shipping companies had raised freights 4d. per bunch and 8d. per case on bananas, and had stated that the increase was to be a permanent one. That was a serious matter to the colony.

Mr. Wilson, manager of the Fiji Fruit Company, Limited, said the increase in freight equalled about 33 per cent., compared with 25 per cent. on other articles. Calling attention to the increased expenses since 1911, he explained that the Commonwealth Government in that year put on an extra tax of 6d. per cental on the fruit (about 2d. per bunch). On 15th July, 1911, a tax of ½d. per bunch was imposed by the Fiji

Government; it was increased on 18th January, 1913, to 1d. per bunch, and lately the steamship companies had imposed a further tax of 4d. per bunch, so that now each bunch of bananas shipped was costing 7d. more than it did in 1911. On 1¼ million bunches, the money taken out of the pockets of fruit shippers would amount to some £40,000 per annum. Mr. Wilson said, unless some way was found of having the freight on fruit reduced to the old rate, the fruit trade of the colony was doomed. To his mind there were only two ways to help themselves:—(1) To induce, by subsidies, some other company or companies to take up the trade; (2) to form a local company for the purpose of chartering suitable vessels to carry on the trade. Personally, he favoured the latter plan. He proposed that a committee be selected from the heads of the business firms, and an equal number of planters and fruit shippers be appointed, to formulate a prospectus and float a company of, say, £100,000 capital.

Mr. Wilson moved that a committee be appointed to consider the best way to deal with the matter of increased freights; that representations be made to the shipping companies per cable; and that the committee report to a subsequent meeting to be convened. Upon being put to the meeting, the motion was declared carried unanimously.

At a subsequent deputation to the managers of the two steamship companies, one speaker said that the Fiji Fruit Company had lost £6,000 for the first six months of this year. The manager of the Union S.S. Company pointed out that the cost of shipping had gone up 25 per cent. in the last five years, and that there were two rises in wages yet to come for this year. He subsequently consented to forward the following cable to his head office:—"Representatives banana shippers and commercial community ask me strongly urge you reduce new freights, especially increase on bananas; feeling very strong; meeting held, resolutions carried protesting; deputation waited me this morning; opinion unanimous here if increase persisted in banana industry doomed. Early reply."

ANOTHER COCKROACH POISON.

Residents in the tropics are, at one time or another, interested in controlling cockroaches, which, if left to develop unchecked, often become a great nuisance. The mixtures of chocolate and boric acid, molasses and boric acid, and flour and plaster of Paris are all generally known. Another mixture which has recently been tried in Barbados with apparently very good results contains naphthalene and boric acid in equal parts, the naphthalene being pounded or crushed in a mortar to a fine powder before being mixed with the boric acid.

This mixture has been sprinkled plentifully in the haunts and hiding places of cockroaches at intervals, say, of about two weeks, and after two or three applications the insects almost entirely disappeared. Readers of the "Agricultural News" may be glad to try this mixture in order to compare the results with those yielded by the use of the better-known cockroach poisons.—"Agricultural News," Barbados.

SISAL HEMP.

There is considerable demand for sisal fibre, prices for which, according to latest London advices, have advanced from £33 10s. per ton for first quality to £34 10s., and it is expected to obtain higher prices later. This is probably due in some degree to the rebellion in Mexico, which country is the principal exporter of sisal fibre.

Inquiries have also been made from Africa, the Federated Malay States, Fiji, and other countries for Sansivieria (Murva) and Sisal plants in Queensland.

TIGER SNAKE SWALLOWING ANOTHER.

Our photograph was taken by Mr. W. E. Mole, of Southport, when in the North. He came across an 8-ft. long tiger snake, which was busily engaged in absorbing another tiger snake, 6 ft. long. He killed the cannibal snake, and found that half the victim, which was almost as large as itself, had been already engulfed. Unfortunately, the blacks had injured the larger snake with sticks. Otherwise it would have been interesting to have ascertained how long the entire process of deglutition would have taken.

With reference to our notice of a laughing jackass swallowing a snake, in last month's issue of the journal, Mr. H. I. Tubbs, Redcliffe, instances a similar case. A blackfellow had caught the bird at Burpengary Creek. It had caught a young snake and tried to swallow it, but it was too large, and there the snake hung, about a foot or more still unabsorbed, and the unhappy bird could neither swallow nor eject it, nor was the jackass able to fly away with its burden. Hence its capture.

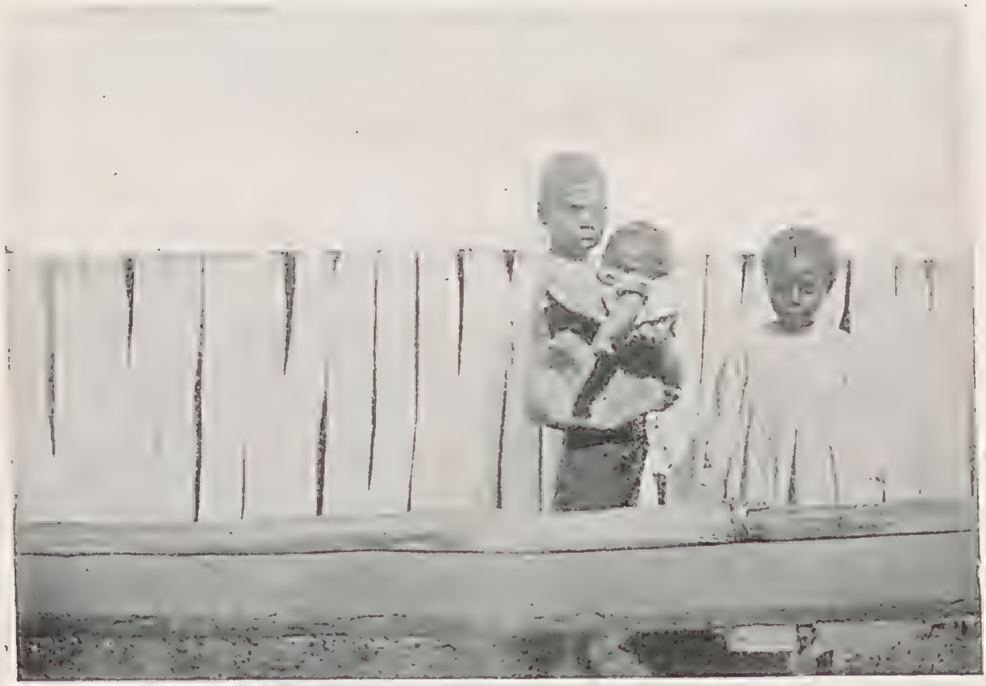


PLATE 149.—TIGER SNAKE AND ITS VICTIM.

ALLEGED CURE FOR SNAKE-BITE.

In the issue of this journal for August, 1913, we published an extract from "The Over-Seas Daily Mail," in which it was stated that the juice of the stem of the banana plant is an effectual remedy for the bite of a venomous snake. Having occasion to look up an article in one of the earlier journals, we found the following notice on "Cure for Snake Bite" in the issue for November, 1901, page 513, which shows that the banana-juice remedy was known over a century and a-half ago. It is to the following effect:—

"CURE FOR SNAKE-BITE.

"We have heard of several infallible cures for snake-bite, but many of them are only infallible from the inventor's point of view. Now, a Dr. Speissiger has submitted the following prescription which appeared in a Carolina (U.S.A.) Gazette so far back as 1749. It was discovered by a negro slave, and is said to be infallible. As a reward for his discovery he was given his freedom and a pension for life:—

"Take of the roots of plantain or horehound (in summer, roots and branches together) a sufficient quantity; bruise them in a mortar, squeeze out the juice, of which give as soon as possible one large spoonful. If the person is swelling, it must be forced down the throat. This generally will cure. If the patient finds no relief in an hour after, give another spoonful, which never fails. If the roots are dried, they must be moistened with a little water.

"To the wound may be applied a leaf of good tobacco, moistened with rum. The plantain and horehound roots are easily procured in Queensland. Happily, deaths from snake-bite are rare in this State, but it is well to know of even a possible cure. Some districts of Queensland are infested by death adders. Residents in such places should take note of any possible cure, as the strychnine cure may not be always available."

The plantain here mentioned is the Banana known botanically as *Musa paradisiaca*. What properties the juice of this plant has in common with that of horehound we cannot say, but it seems to be taken for granted that the juice is merely water holding some astringent, and, so far as we are aware, no chemist has troubled to analyse it. We heard that only lately, in North Queensland, a cure had been effected by its means. Unfortunately, we could get no reliable information on the case which was said to have emanated from Cairns or Port Douglas. One scientific gentleman, to whom we mentioned the matter, said that absolute proof is necessary of its curative properties; but who would risk applying it in preference to known remedies? Very reasonable, but we have travelled in country, especially in New Guinea, where death adders literally swarm, and where no remedies are available, but these plantains abound. If this alleged remedy were there known, would anyone hesitate to try it? One argument against it is that snake poison affects the blood, and that any internal application in the shape of a draught could have no effect on the blood. At all events, experiments could be made on the lower animals, such as cattle, dogs, guinea pigs, or even pigs, which are believed to be immune to snake-bite, and, again, on natives who are

frequently bitten by death adders, and have, as far as white men know, no antidotes, unless they possibly know of the plantain juice cure. At all events, the subject is worth investigating in countries where snakes abound, especially in India, where thousands of natives die every year from snake-bite. 120,800 persons died last year in India from snake-bite.

QUEENSLAND COTTON.

A small quantity of cotton grown by farmers in various parts of the State last season has been sold locally at 6d. per lb. An offer of 6¼d. per lb. was received too late for acceptance.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Oct.	Average Rainfall. No. of Years' Records.	Total Rainfall. Oct. 1913.	Total Rainfall. Oct. 1912.
North Coast.	In.		In.	In.
Atherton	0·81	11	0·48	0·25
Cairns	1·53	25	2·83	2·25
Cardwell	1·77	25	1·46	1·22
Cooktown	0·81	25	2·54	2·69
Herberton	0·98	25	0·66	0·78
Ingham	1·44	20	1·32	0·65
Innisfail	2·43	25	3·13	1·58
Mossman	3·31	5	4·17	5·49
Townsville	1·34	23	0·31	0·64
Central Coast.				
Ayr	0·93	25	0·12	0.46
Bowen	0·86	25	Nil	2·46
Mackay	1·54	25	0·03	7·28
Proserpine	1·62	10	0·05	3·14
St. Lawrence ...	1·69	25	Nil	3·44
South Coast.				
Crohamhurst ...	3·71	20	0·33	6·66
Biggenden	2·23	14	1·04	..
Bundaberg	1·93	25	0·18	3·74
Brisbane	2·75	62	0 78	5·85
Childers	2·02	17	0·30	3·68
Esk	2·46	25	0 95	2·67
Gayndah	2·29	25	0·47	2·85
Glasshouse M'tains	...	...	0·27	6·60
Gympie	2·45	25	0·15	2·94
Kilkivan	2·52	25	0·53	3·77
Maryborough ...	1·92	25	3 51	5·54
South Coast—continued:	In.		In.	In.
Nanango	2·26	25	0·27	3·94
Rockhampton ...	1·51	25	Nil	6·87
Woodford	2·64	25	1·09	6·78
Yandina	3·27	19	0 07	5·71
Darling Downs.				
Dalby	2·49	22	0·65	3·36
Emu Vale	2·60	17	2·26	2·68
Jimbour	2·01	24	1·37	2·71
Miles	2·06	25	1·12	3·87
Stanthorpe ...	2·64	22	3·03	2·69
Toowoomba ...	2·67	22	2·33	5·41
Warwick	2·58	22	2·04	3·75
Maranoa.				
Roma	1 87	21	1·19	1·95
State Farms, &c.				
Gatton College ...	2·56	14	1·87	4·99
Gindie	1·17	13	Nil	1·50
Kamerunga Nurs'y	1·53	23	1·38	...
Kairi	...	..	0·60	...
Sugar Experiment Station, Mackay	1·60	16	Nil	7·28
Bungeworgorai ...	...	...	1·84	1·96
Warren	...	...	Nil	...
Hermitage ...	2·15	7	3·45	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Answers to Correspondents.

NON-FRUITING OF BRAZILIAN CHERRIES.

R. HODGE, Isis Central Mill—

Mr. C. Ross, Instructor in Fruit Culture, in reply to your inquiry about the non-fruiting of Brazilian cherries, says:—

"There are so many contributing causes why fruit does not set that it is difficult to determine in this case without further particulars. Such a condition may be the result of sudden atmospheric change from heat to cold, and *vice versâ,* water-logging at the root, or excessive dryness of the subsoil. The root system should be examined and drainage seen to. A shallow retentive clay or excessive porosity of the subsoil are inimical, and drainage would correct either condition. Explosives applied a few feet from the stem at a depth of 2 to 3 ft. would be beneficial."

Your question *re* calving has been replied to by letter.

PROTECTING FENCING POSTS AGAINST WHITE ANTS.

THOS. BIDDLE, JUNR., Tamaree, Gympie—

Any of the white-ant mixtures, as sold commercially, are pretty good, if properly applied as directed.

Arsenical dip fluids are also fairly satisfactory, if given two coats with a brush at intervals of 12 hours.

A good recipe is the following:—

Mix castor oil, arsenic, and molasses or brown sugar together just sufficiently thin to lay on with a paint brush; the molasses or sugar should be dissolved in sufficient hot water to make a strong solution; 1 gallon of castor oil should then be stirred into it, and 1 lb. of arsenic added while boiling. Care must be taken not to imbibe the fumes, as they are poisonous.

Two coats of this are generally effective in preventing the attacks of white ants, if thoroughly well rubbed in with the brush.

Another very excellent recipe is the following, but it must be used with great care:—

Boil ordinary coal tar in any vessel such as a kerosene tin; mix with this 1 lb. of arsenic to each gallon of tar, prepared by first stirring up the arsenic into a paste or thick solution with kerosene. After well mixing, lay on a thick coat with a tar brush; then roll the post in the sand until the latter is about ¼ in. thick. Give another coat of tar and arsenic, and again roll in the sand. In course of time this sets very hard, and is very durable.

POULTRY DISEASE.

"WYANDOTTE," Ravenshoe—

The birds in question are suffering from "diphtheric roup."

Treatment.—Isolate in a house free from draught, and give each from one-third to half a teaspoonful of Epsom salts; then get a bottle of the ordinary chlorate of potash and perchloride of iron mixture from the chemist, and, six hours after the salts, give one-quarter ordinary adult doses; feed on good soft food, unprepared, but mixed with hot water and a little brandy. Then get the following dressing:—Carbolic acid, 1 drachm; sulphurous acid, 3 drs.; tincture perchloride of iron, ½ oz.; glycerine, ½ oz. With a camel-hair brush, touch all the parts which show sores, morning and evening, taking care in anointing the throat not to choke the bird by a drop going the wrong way.

This disease is highly contagious in the fowl-house.

See "Queensland Agricultural Journal" for June, 1902. The symptoms are identical.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER, 1913.

Article.		NOVEMBER. Prices.
Bacon, Pineapple	lb.	11d. to 11½d.
Bran	ton	£5
Butter	cwt.	104s.
Chaff, Mixed	ton	£3 12s. to £5
Chaff, Oaten (Local)	,,	...
Chaff, Oaten (Victorian)	,,	£4 to £5 10s.
Chaff, Lucerne	,,	£3 to £5
Chaff, Wheaten	,,	...
Cheese	lb.	6½d.
Flour	ton	£9
Hams	lb.	1s. 3½d.
Hay, Oaten (Victorian)	ton	£5 10s. to £6 10s.
Hay, Lucerne (Prime)	,,	£4 to £4 10s.
Honey	lb.	2d. to 3¼d.
Maize	bush.	3s. 9d. to 4s.
Oats	,,	3s. 10d.
Onions (Local)	ton	£8 to £10
Onions (Japanese)	,,	£12 10s.
Onions (American)	,,	£15
Pollard	,,	£5
Potatoes (New)	,,	£8 to £12
Potatoes (Old)	,,	£2 to £3 10s.
Potatoes (Sweet)	cwt.	1s. 6d. to 2s.
Pumpkins	ton	£4 to £5
Wheat, Milling	bush.	3s. 6d. to 3s. 7d.
Eggs	doz.	8d. to 9d.
Fowls	pair	3s. 6d. to 4s. 3d.
Geese	,,	5s. to 6s. 3d.
Ducks, English	,,	3s. 9d. to 4s. 3d.
Ducks, Muscovy	,,	4s. 9d. to 5s. 6d.
Turkeys (Hens)	,,	8s. to 9s.
Turkeys (Gobblers)	,,	16s. to 18s.

LONDON QUOTATIONS.

(Cotton) Uplands)	lb.	7·12½d.
Rubber (Fine hard Parà)	,,	3s. 2d.
Plantation Rubber	,,	2s. 3d.
New Guinea Ball	,,	1s. 9d.
Copra, Malabar	ton	£34
,, Ceylon	,,	£33 15s.
,, Straits	,,	£31 5s.
,, Zanzibar	,,	£30 15s.
,, South Sea	,,	£32 15s.
Vanilloes	lb.	9s. 6d. per lb.

SOUTHERN FRUIT MARKETS.

Article.	NOVEMBER. Prices.
Bananas (Fiji), G.M., per case	18s. to 18s. 6d.
Bananas (Fiji), G.M., per bunch	5s. to 10s.
Bananas (Queensland) per case	13s. to 14s. 6d.
Passion Fruit, per half-case	9s. to 10s.
Pineapples (common)	9s. to 10s.
Pineapples (Ripleys), per case	9s. to 10s.
Pineapples (Queens), per case	9s. to 11s.
Strawberries (Local) per dozen punnets	8s. to 18s.
Tomatoes, per half-case	5s. to 6s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	NOVEMBER. Prices.
Apples, Eating (American), per case	10s. to 12s. 6d.
Apples, Cooking (American), per case	4s. to 7s. 6d.
Apricots, per quarter-case...	9s. to 10s.
Bananas (Cavendish), per dozen	3d. to $4\frac{1}{2}$d.
Bananas (Sugar), per dozen	2d. to $3\frac{1}{2}$d.
Cape Gooseberries, per quarter-case	6s. to 10s. 6d.
Cherries, per quarter-case	7s. to 10s.
Cocoanuts, per sack	13s. to 14s.
Lemons (Local), per case	5s. to 7s. 6d.
Lemons (Italian), per case	16s. to 17s.
Limes, per case	5s. to 6s.
Mandarins, per case	3s. 6d. to 8s.
Mangoes, per case	9s.
Oranges (Navel), per case	8s. to 12s.
Oranges (other), per case	9s. to 12s.
Papaw Apples, per quarter-case	1s. 3d. to 3s.
Passion Fruit, per case	5s. to 7s. 6d.
Peaches, per quarter-case	3s. 6d. to 6s.
Peanuts, per lb.	$2\frac{1}{2}$d. to 3d.
Pineapples (Ripley), per dozen	3s 6d. to 6s.
Pineapples (Rough), per dozen	1s. 6d. to 4s. 6d.
Pineapples (Smooth), per dozen	4s. to 6s. 3d.
Plums, per case	3s. to 7s. 6d.
Rockmelons, per dozen	3s.
Strawberries, per tray	1s. to 3s. 6d.
Strawberries, per dozen boxes	5s. 6d.
Tomatoes, per quarter-case	3s. to 6s. 6d.
Watermelons, per dozen	9s. to 14s.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1913.

Animal.	OCTOBER. Prices.
Bullocks	£13 7s. 6d. to £15 5s.
Cows	£8 15s. to £10 2s. 6d.
Merino Wethers	23s.
Crossbred Wethers...	22s.
Merino Ewes	16s.
Crossbred Ewes	18s.
Lambs	18s. 6d.
Pigs (Porkers)	45s.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for Autumn and Winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seed for a late crop. The latter are, however, unlikely to succeed, except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

Flower Garden.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand,* as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to overwater at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in Autumn and Winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fiy-infested.

Watermelons and rockmelons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

THE TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the Autumn crop of oranges.

Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe districts; apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, and grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market—not before. If sent down green, they will sell for cooking and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. backets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.